JUNE 18, 1956

# STEEL
## The Metalworking Weekly

A PENTON PUBLICATION

A PROGRAM FOR MANAGEMENT IN 1956 . . No. 5

# Metalworking's New Horizons

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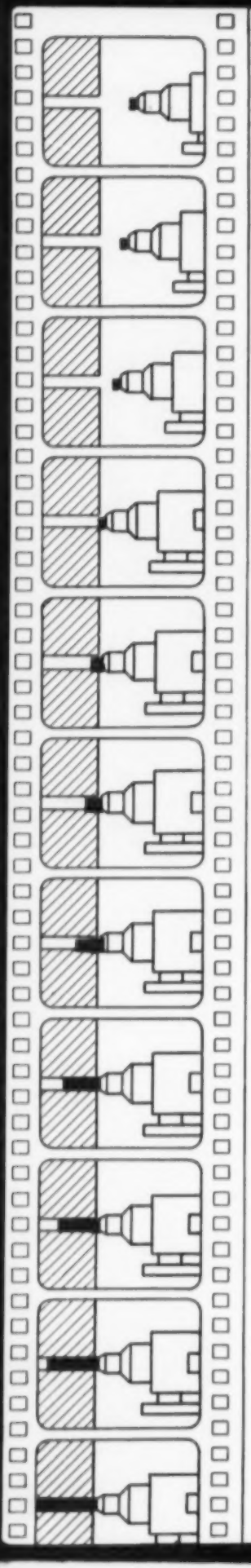
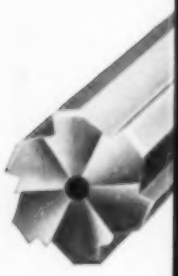


## New Heald Method of

# BORE REAMING



## keeps small-hole finishing

## on the STRAIGHT AND NARROW

CUTTING ACTION takes place here, at BORE REAMER end face.

FLUTED EDGES support BORE REAMER and provide chip clearance.

BORE REAMER, of solid tungsten carbide, feeds out into hole.

SUPPORT BUSHING rotates with the BORE REAMER.

IT'S NOT *boring*, not *reaming*—but a unique combination that gives you the desirable features of *both*. For long, small-diameter holes, BORE REAMING provides a high degree of accuracy and precision economically.

The BORE REAMING tool, or BORE REAMER, is firmly supported by a rotating bushing, immediately next to the face of the work, and is fed outward into the hole by a mechanical or hydraulic feed-out mechanism. Cutting action takes place only at the outer end edge of the BORE REAMER *face*. It penetrates as straight and true as a single-point boring tool, without a conventional reamer's tendency to follow irregularities in the drilled hole. Since the support bushing rotates with the BORE REAMER, the only wear is from the slow in-and-out movement of the tooling.

Finish size of any hole is determined solely by the BORE REAMER diameter—hence a change in hole size is simply a matter of changing the BORE REAMER, with no need for delicate tool adjustments.

If you do work that falls into the BORE REAMING class, this is something you should look into. Your Heald representative will be glad to give you the complete story. Remember, IT PAYS TO COME TO HEALD.

**THE HEALD MACHINE COMPANY**

Subsidiary of The Cincinnati Milling Machine Co.

**Worcester 6, Massachusetts**

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

HEALD®

# Tool Steel Topics

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributors: Bethlehem Steel Export Corporation


## Airplane Builder's Change to Bearcat Increases Life of Rivet Sets 5 Times

At the Wichita, Kans., plant of Boeing Airplane Company, rivet sets used on the B-47 and B-52, as well as other types of aircraft, had been providing satisfactory results. But, Boeing engineers reasoned, by checking the performance of other grades of tool steel in the same application, they might discover a tool steel that could do a better, more economical job.

So they ordered Bearcat, from Ford Steel Company, their Bethlehem tool-steel distributor in St. Louis. The results were impressive. The Bearcat sets gave five times longer service life then the sets previously used. In addition, the heads also drove down better, thus minimizing time lost in reworking, and facilitating ready acceptance by Boeing inspectors. Besides, with Bearcat's superior finish, there was less surface pick-up.

Bearcat is our super-tough, air-hardening general-purpose grade. It has exceptional resistance both to shock and to wear. Its air-hardening characteristic minimizes quenching hazards, and provides excellent resistance to distortion in heat-treatment.

In addition to rivet-set applications, Bearcat can be used advantageously for punches, chisels, hot headers, gripper dies and master hobs, as well as for dies used in blanking and bending, and cold-forming.

If you'd like to know more about Bearcat, or perhaps try it out in your shop, just get in touch with the nearest Bethlehem tool-steel distributor.

### BETHLEHEM TOOL STEEL ENGINEER ASKS:

## How Hard Should Tools Be?

It is sometimes difficult to determine the best hardness for certain tools. As all tools are subjected to wear it is ordinarily desirable to use the highest possible hardness. With most tools, this causes brittleness or breakage, making some compromise necessary. Generally speaking, tool hardness should be lowered from the maximum to a degree which causes the tools to consistently wear out in service, rather than fracture. The optimum hardness for a given type of tool often varies considerably, depending upon the operating conditions. However, here are the average hardnesses of commonly used tools:

| TOOL | HARDNESS ROCKWELL C |
|---|---|
| High-speed steel, metal-cutting tools, single point | 65 |
| High-speed steel, metal-cutting tools, multiple point | 63 |
| Blanking dies | 60 |
| Forming dies | 60 |
| Drawing dies, hardened all over | 60 |
| Drawing dies, bore-hardened only | 66 |
| Gages | 60 |
| Shock-resisting tools (punches, etc.) | 58 |
| Hot-work tools | 40/50 |
| Cold shear blades | 60 |
| Hot shear blades | 48 |
| Tools subjected to max tensile loads (cylinders, containers, etc.) | 53 |
| Tools subjected to max compressive loads (plungers, punches, etc.) | 60/65 |

These hardness figures should be used as a guide only, because for individual jobs the required hardness may be slightly higher or lower, depending upon circumstances.

## Tool Steel Color Film An Award Winner

"Teamwork," Bethlehem's 16-mm color film on tool steel, received an award for excellence in the sales promotion field at the recent Columbus Film Festival, held at Columbus, Ohio. The film, being received enthusiastically in all parts of the country, shows the manufacture of Bethlehem tool steels, and explains the reasons behind their quality control and heat-treatment. Typical applications of various grades are included.

The picture runs for 30 minutes. It is available for showings to machinists, die-makers, heat-treaters, machine-tool manufacturers and distributors. Its subject matter makes it excellent for technical society meetings, and for showings to engineering-student groups.

If you would like to see "Teamwork," drop a line to Publications Department, Room 1001, Bethlehem Steel Company, Bethlehem, Pa. If possible, please select a showing date well in advance, to permit adequate time for scheduling and shipping.

*International Products & Mfg. Co.*

*switched to La Salle* **fatigue-proof** STEEL BARS

# TO MAINTAIN UNIFORMLY HIGH QUALITY

International Products & Manufacturing Company is now specifying "FATIGUE-PROOF" steel bars for generator and starter shafts. These are heavy-duty shafts. Formerly they used 4140 or 8640 heat-treated.

Field failures can be anticipated unless the finest of materials and the best of manufacturing practice are employed.

"FATIGUE-PROOF," by eliminating heat-treatment, does away with any possibility of quench cracked shafts getting past inspection. Since no straightening after heat-treatment is required, unfavorable residual stress due to severe straightening operations cannot be present.

It's another case where "FATIGUE-PROOF's" high strength in-the-bar eliminates a possible cause of trouble.

If you want to improve the quality of your products and avoid the problems of machining or heat-treating parts from high strength carbon or alloy steels . . try a sample bar of "FATIGUE-PROOF." If you will give us application details, send a blueprint, or call La Salle Sales Engineer at REgent 4-7800, Chicago, Illinois, he will send you a test sample if it appears "FATIGUE-PROOF" can be used to your advantage.

*International Products & Manufacturing Co., of Chicago, are manufacturers of automotive starter and generator parts.*

NEWLY PUBLISHED!
*Get your copy of this 20-page booklet which gives detailed information on the remarkable new "FATIGUE-PROOF."*

**La Salle STEEL CO.**
1414 150th STREET, HAMMOND, INDIANA
Manufacturers of America's Most Complete Line of Quality Cold-Finished Steel Bars

Please send me your "FATIGUE-PROOF" Bulletin.

name _____
title _____
company _____
address _____
city _____ zone _____ state _____

# Super finish for turbo-supercharger

*A leading manufacturer of turbo-superchargers uses Osborn's Brushamatic* 3A to cut compressor wheel finishing costs from 48¢ to 16¢ per part.*

*Trade-Mark

THIS aluminum compressor wheel is the heart of a new turbo-supercharger designed to increase engine horsepower up to 60%. Osborn power brushing methods remove all machining burrs from this compressor wheel . . . maintain a finish tolerance of two ten-thousandths of an inch. In addition to improving the quality of this compressor wheel, Osborn power brushing cuts finishing time from 12 minutes to 4 minutes per part.

The automotive industry is just one of many using Osborn power brushing to improve and speed up finishing operations.

An **O**sborn **B**rushing **A**nalysis, made in your plant, will show how *you* can improve finishes, reduce finishing costs. Write *The Osborn Manufacturing Company, Dept. G-45, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushes

OSBORN

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

# "They Should'a Bought GOULD Research-built BATTERIES"

America's Finest!
GOULD
Industrial Truck Batteries

You'll have no regrets if you standardize on Gould Research-Built Batteries. As a matter of fact, you'll be mighty glad you did. These advance-design batteries are tested and proved in Gould's own research laboratory and pilot plant before they go into factory production. That's why Gould Batteries have earned an enviable reputation for exceptional performance and long, trouble-free service life.

Gould's Field Engineering Service—finest in the industry—helps you keep your Gould batteries working at top capacity . . . adds months to their normal life. Get more power per dollar—with GOULD!

*Always Use Gould-National Automobile and Truck Batteries*

**GOULD**
**BATTERIES**
GOULD-NATIONAL BATTERIES, INC.
Trenton 7, N. J.

**"BETTER BATTERIES THROUGH RESEARCH"**

©1956 Gould-National Batteries, Inc.

STEEL
The Metalworking Weekly

JUNE 18, 1956
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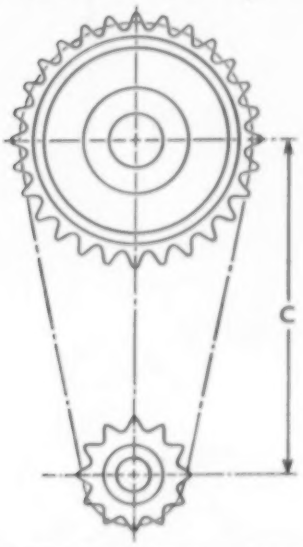
**Designers!**

*Determine this Chain Length*




**GIVEN:**

| | |
|---|---|
| Teeth in small sprocket | 17 |
| Teeth in large sprocket | 78 |
| Center Distance | 36" |
| Pitch of Chain | 1" |

To find — Chain length in inches.
*(Answer below)*

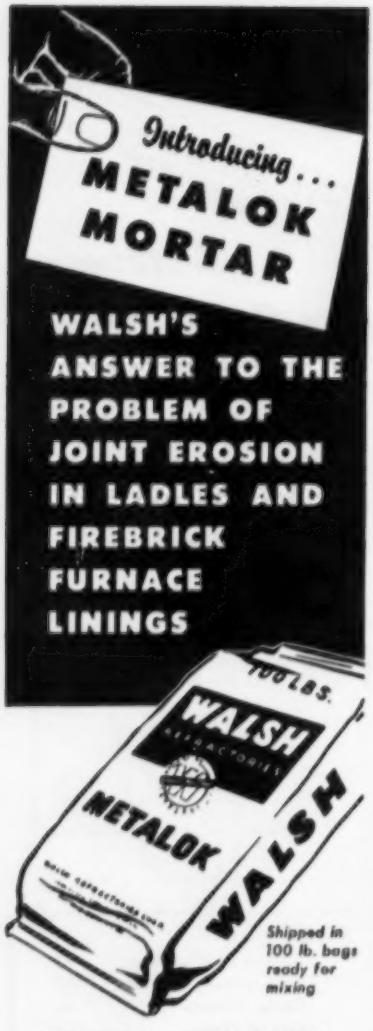
Acme Chains latest 76 page catalog brims with chain data. Filled with information on the correct and most efficient use of roller chain, cable chain and all types of sprockets. Among many other things it gives you the correct formula for computing proper chain lengths.

*Answer: 122.12*

**FREE**

*76-page Catalog on application and use of Chains sent on written request. Write Dept.10B. Acme Chain Corp., Holyoke, Mass.*

Acme Chain Corporation
HOLYOKE MASSACHUSETTS




*Shipped in 100 lb. bags ready for mixing*

**Used in laying up Walsh Ladle brick, Metalok successfully retards penetration of metal and slag... reduces joint erosion to the barest minimum — definitely increases ladle lining life.**

**For greater satisfaction and improved service in slab, reheat and other metallurgical furnaces, get acquainted with new Metalok. A trial will convince you. Write today for the complete money-saving story.**

***Specialists in Refractories of High Bulk Density and Low Porosity***

**WALSH REFRACTORIES CORPORATION**

101 FERRY ST. · ST. LOUIS 7, MO.

FOR OVER 60 YEARS MANUFACTURERS OF HIGH GRADE REFRACTORIES


# behind the scenes

## Dig That Future

The Program for Management story this week (page 137) brings you back to the time you became acquainted with Jules Verne. Remember how that old boy could prove anything by science? When he assembled a cast of characters and shot them off to the moon in a rocket, he didn't overlook any eventuality. At a certain point in the flight, somebody dropped a cup of tea, but it didn't fall. Verne's characters, however, explain everything. The gentleman who dropped the tea said, in effect: "Ah, according to my watch, slide rule and pressure gage, we are precisely at that point between earth and moon where the gravitational pull is equalized. Tiens! Nothing can fall, neither up nor down."

"Metalworking's New Horizons" in this week's issue brings Jules Verne up to date in three dimensions. Many of the things he dreamed about now exist, and are in production. Metalworking management may now, like Stephen Leacock's celebrated hero, mount and ride off in all directions: Toward the fields of guided missiles, new metals, new ships and aircraft; toward satellites, electronics, miniaturization and atomic energy. New horizons, new markets, greater production, more money . . . isn't it a fascinating prospect? We suspect that the article will be widely ordered in reprint form, so if you're figuring on making a report to your board of directors recommending production of miniature refrigerators or atomic powered pogo sticks, better get your request in early. These Program for Management reprints go like Verne's rocket.

## Improved Advertising

In art, music, literature and architecture, new developments smother old ones, and the net result is generally regarded as progress. In art, we move from academicism to impressionism; in music, from Bach to be-bop; in literature, from restraint to profanity; in architecture, from mansard to ranch style, with easy payments. In the field of business publications (bet you thought we got sidetracked for sure that time, didn't you?), industrial advertising has made some excellent progress, too. Some time when you can afford to invest a few minutes in cultural research, flip through some yellowed back numbers of business papers, and get a load of that real gone advertising. The point we wish to establish is that modern industrial advertising is real cool, man; completely knocked out in comparison with the weird displays of yesteryear.

## Be Our Guest

Many of the ads that appear in STEEL each week are a delight to the eye. In an effort to determine the value of our own appreciation, we submitted a copy of last week's issue (June 11) to an assortment of artists and art editors with a request: "Would you please," the artists were asked, "go through this copy of STEEL and select six, in your opinion, of the best looking ads in the magazine? We want to see what the experts think. Advertisers, space salesmen and editors conceivably could be prejudiced, but when it comes to a question of art, the best qualified judges should be artists."

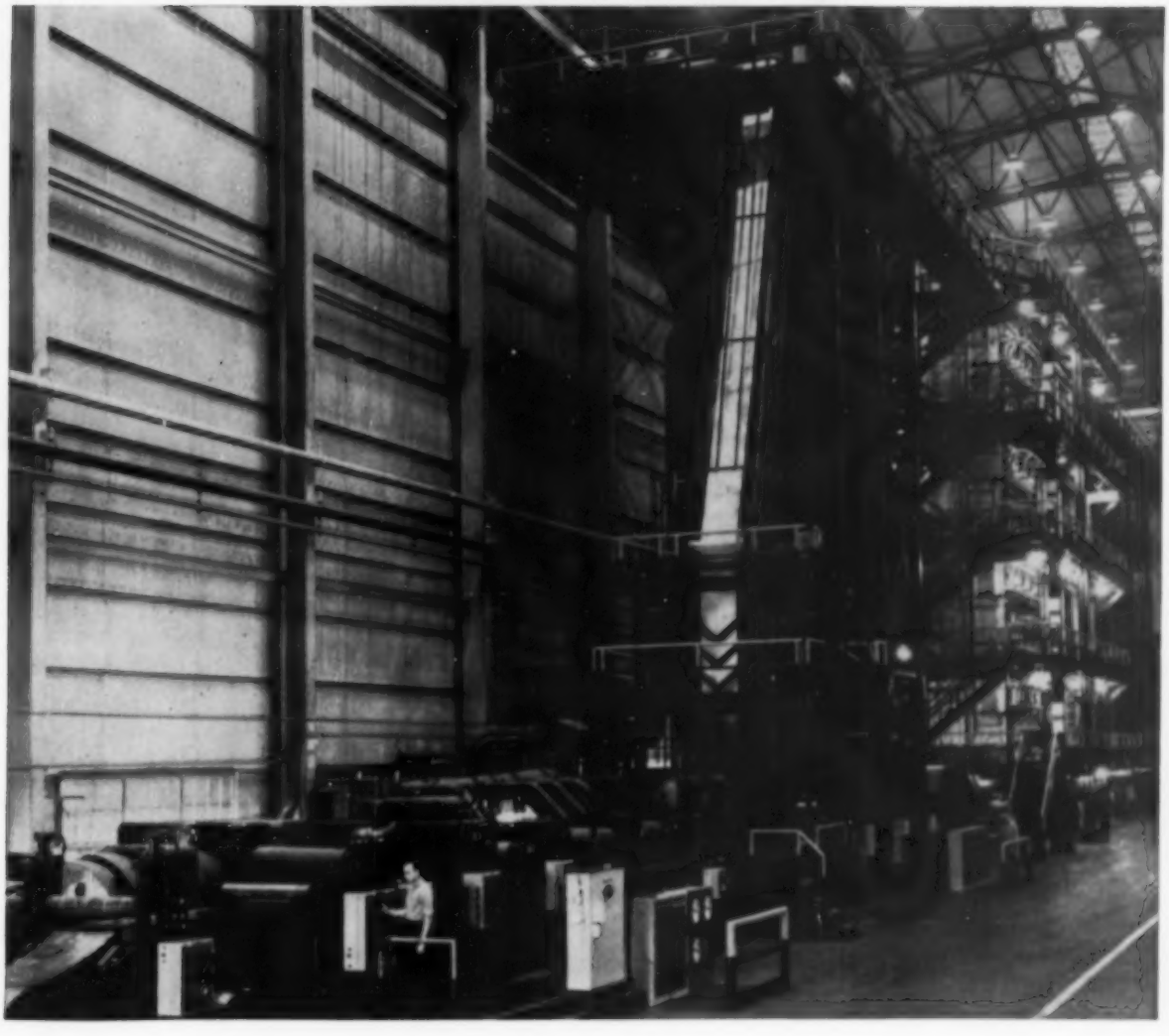
Right away the artists set up a clamor. Was this some sort of a sneaky test? Would they lose a merit badge if they failed to select some prominent advertiser? Why couldn't they select an earlier issue? Why couldn't they search through *Fortune*, instead, or *Holiday*, or *National Geographic*? When threatened with the loss of certain privileges, such as the right to broil editors, they went to work and selected the ads requested.

Now, here's the pitch. We have that list safely stashed away in the locked vaults of a certain Bankers' Trust Co., and if you can guess the names of the first six industrial advertisers selected by most of the artists, we'll buy a dinner for two with all the trimmings. Simply glance through the June 11 issue of STEEL; pick out the six best looking ads; and shoot the information secretly to Shrdlu, Penton Bldg., Cleveland 13, O.

*Shrdlu*

(Metalworking Outlook—Page 91)

# B.F.Goodrich



# Rubber stretches a mile of steel

***A typical example of B. F. Goodrich improvement in rubber***

THAT'S a mile-long strip of steel on its way to becoming tin cans. To toughen steel, they run it through that continuous annealing line at speeds up to 900 feet per minute. It does in 20 minutes what used to take two days. But for a while it looked like one of those good ideas that just wouldn't work.

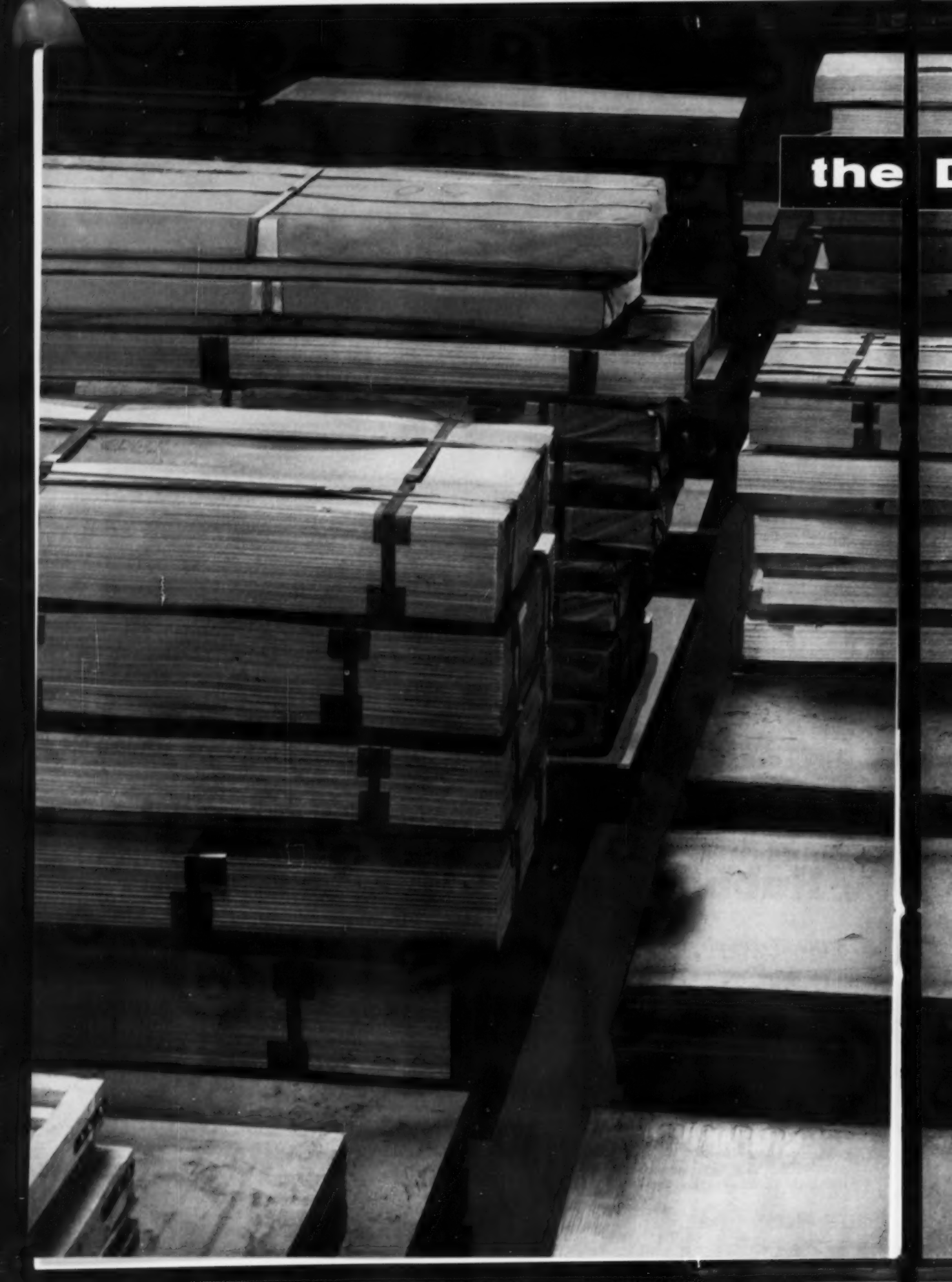
The trouble was with the rubber-covered rolls that keep the long strip moving. After just a few hours, the rubber was worn smooth and shiny with rubbing plus high speed. Then the rolls couldn't grip, the steel smeared and couldn't be used for cans.

B. F. Goodrich engineers worked on the problem, and came up with a new rubber compound that helped make this process really practical. Rolls covered with the special rubber don't slip, don't glaze, don't mar the finish of the steel. And, in the mill shown here, B. F. Goodrich Strip-Grip rolls are lasting 10 times longer than the rolls used before.

Finding a way to improve steel mill rolls is an example of the B. F. Goodrich method of approaching a customer's problem. We have been able to solve equally difficult ones, just as successfully, in products you undoubtedly use. Your B. F. Goodrich distributor would like to tell you what these improvements are, and how they can be employed for your profit. *B. F. Goodrich Industrial Products Company, Dept. M-650, Akron 18, Ohio.*

**B.F.Goodrich**

**INDUSTRIAL PRODUCTS**


the D

# e Department Store of Steel

CHICAGO • CINCINNATI • CLEVELAND • DETROIT • HAMMOND • INDIANAPOLIS • LANCASTER
LOUISVILLE • MEMPHIS • NASHVILLE • NEW ORLEANS • NEW YORK • PITTSBURGH

**WAREHOUSING**
a complete line of standard products and special steels—large diversified stocks of hot rolled, cold rolled, galvanized and stainless sheets for immediate delivery.

**PROCESSING**
shearing, blanking, torch cutting, forming, metal sawing, slitting and other processing operations to your specifications.

**PROMPT DELIVERY**
steel for the man in a hurry—our efficient warehouse methods permit fast delivery on a moment's notice from your J&L Warehouse

JONES & LAUGHLIN STEEL WAREHOUSE DIVISION
J&L
The Department Store of Steel

**JONES & LAUGHLIN STEEL WAREHOUSE DIVISION**
JONES & LAUGHLIN STEEL CORPORATION

DIVISION OFFICES INDIANAPOLIS 7, INDIANA

# FIRE!

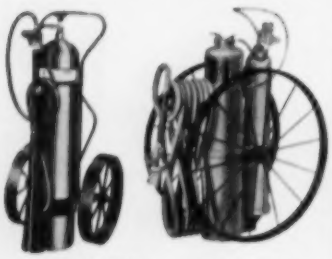
## HOW TO DETECT AND EXTINGUISH IT IN SECONDS!

### HAND PORTABLES

Carbon Dioxide | Foam Soda-Acid Clear Water Anti-Freeze | Pressurized Water Anti-Freeze | Dry Chemical

Kidde $CO_2$ Portables, either trigger-release type or squeeze-type valve models, are available in sizes from 2½ to 20-pound capacities. New Kidde Wet Chemical extinguishers are available in 2½ gallon bronze or stainless steel models, including pressurized Water or Water-Anti-Freeze Unit (illustrated). Kidde Dry Chemical Extinguishers are available in cartridge-operated models of 20 and 30 pounds capacity or pressurized models of 5 and 10 pounds capacity.

### MOBILE EQUIPMENT

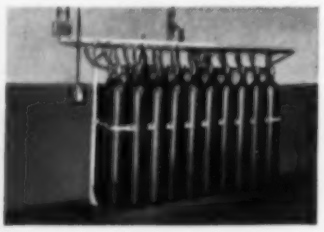


50, 75 and 100 lb. $CO_2$ Units | 150 lb. Dry Chemical Unit

For major fire hazards, get a mobile unit. Wheeled $CO_2$ units are available in 50, 75 and 100 pound capacities, in one cylinder.

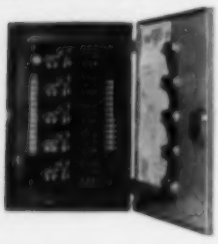
150 pound dry-chemical unit has straight stream for long range . . . fan pattern for wide coverage. Both units give expert results even with inexperienced operator.

### $CO_2$ SYSTEMS



New Kidde pressure-operated $CO_2$ extinguishing systems are individually designed to fully protect even the most dangerous hazards, use no falling weights or clumsy mechanical triggering methods. Pneumatic Control Heads insure instant and complete $CO_2$ discharge. Directional Valves afford protection to more than one hazard using the same bank of $CO_2$ cylinders.

### ATMO DETECTING SYSTEMS



Kidde ATMO is a wide-area automatic fire detecting and warning system which works on the principle of rate-of-temperature-rise. It is ideally suited for cases where life protection is of vital importance, or where quick, early detection of fire in valuable materials is essential.

The very first hot breath of fire triggers the ATMO system, and sounds the alarm. In addition, the system can also close doors, shut off fans or blowers – all *automatically*.

What's more, the Kidde ATMO system operates independently of regular power sources, will still give protection even if outside power fails.

**Kidde**

**Walter Kidde & Company, Inc.**
**660 Main Street, Belleville 9, N. J.**
**Walter Kidde & Company of Canada, Ltd.**
**Montreal—Toronto**


# LETTERS TO THE EDITORS

## Light Protects Hands

I was impressed by your Technical Outlook column (page 101) in the June 4 issue, and especially by the paragraph, "Guarded by Light." It tells of the use of the electric eye for the protection of the operator's hands in operation of presses, shears and similar machinery.

I would appreciate knowing where to obtain more information.

John S. Putrich
General Foreman
Lamp Equipment Operation
General Electric Co.
Cleveland

• *Write: Stephen V. Hart, Vice President, Electronic Control Corp., 1573 E. Forest, Detroit 7, Mich.*

## Plain Speaking Preparation

Please send three copies of the articles, "Rules Need Interpretation" (page 76) and "Get Set for Arbitration" (page 77), from the May 28 issue. These articles are good, and we would like to add them to our library.

F. R. Trainor
President
Trainor National Spring Co. Inc.
New Castle, Ind.

I would appreciate one copy of each of these reports.

J. W. Herrington
Personnel Director
Electroweld Steel Corp.
Azusa, Calif.

Kindly favor me with copies of these two articles.

Frank J. Wandyes
Plant Manager
Henry G. Thompson & Son Co.
New Haven, Conn.

## Gist of Book Given

I enjoyed your article, "Ideas for Industry" (Apr. 23, page 105), immensely, even though I had read Alex Osborn's book.

The article presented the heart of the book dramatically and in a form easily remembered. It preserves the basic approach so that the book comes easily to mind with all its vigor.

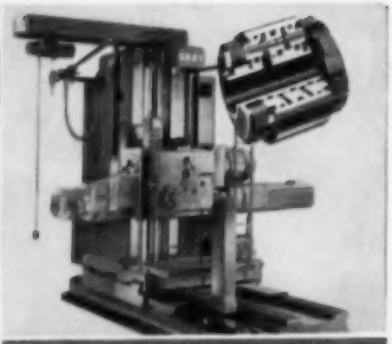
Aside from what this philosophy can do for our economy, it can liberate the forces of an industrial revolution — a revolution which is long overdue. It's like the key to success which Les Giblin speaks of; but this key is in management's pocket. If there is a short run solution to the shortage of executive candidates, this is it. More than choosing candidates from brainstorming sessions, these candidates can be trained during the sessions.

I hope you can spare a copy of your

*(Please turn to page 12)*

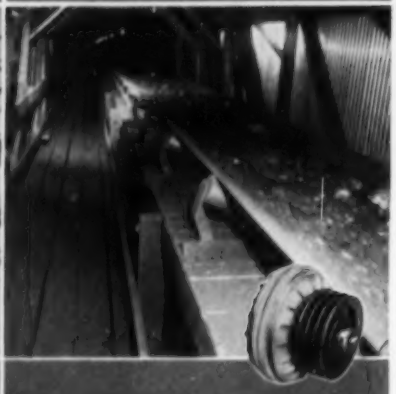
Design Punch
FOR CAR BUILDERS
• Tough, corrosion fighting stainless steel that will resist weather, road abrasion and flying stones, and return to its original brightness when wiped with a damp cloth . . . that's what car buyers want these days.
• Designers with their fingers on the public pulse know this, and that's why next year more stainless steel will be used by the car manufacturers than ever before. A good percentage of this stainless steel will be supplied by Sharon . . . for more than half a century a leading producer of quality automotive steels.
SHARON
Stainless Steel
SHARON STEEL CORPORATION Sharon, Pennsylvania
DISTRICT SALES OFFICES: Chicago, Cincinnati, Cleveland, Dayton, Detroit, Grand Rapids, Indianapolis, Los Angeles, Milwaukee, New York, Philadelphia, Rochester, San Francisco, Sharon, Seattle, Montreal, Que., Toronto, Ont.

CRAWLER TORQUE CONVERTER



OIL-ACTUATED CLUTCH

FRICTION POWER TAKE-OFF



FLUID COUPLING

# Industry wide—where power is applied . . . you find TWIN DISC

Throughout industry—wherever power is applied to driven equipment—you find Twin Disc Friction Clutches and Fluid Drives.

You'll find torque converters on crawler tractors, power shovels, oil well drilling rigs, trucks, logging yarders, winches and many other types of heavy-duty machinery.

You'll find fluid couplings on power shovels, drilling rigs, conveyors, vibrating screens . . . nearly all applications demanding a smooth, *cushioned* flow of power.

You'll find friction clutches and power take-offs on stationary power units, oil and water pumps, machine tools, drilling rigs and on nearly all equipment used in the basic manufacturing industries.

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# LETTERS

*(Concluded from page 10)*

article for me. I want to keep it handy for constant reference—as a reminder that the future will always be bright if I can condition myself to creative thinking.

E. R. Cooper
1314 Treasch Drive
Cuyahoga Falls, O.

This article is most interesting and the idea, we believe, should have as much application in the textile field as in the steel industry. May we have a copy?

M. V. Gowing
Assistant to General Sales Manager
Jantzen Inc.
Portland, Oreg.

## Lesson in Management

May I have a tear sheet of the Mirrors of Motordom column of May 21 (page 83)? The article, "Ford's Scientists Catch Up," has so many factors listed in the treatment of engineering and research personnel that I want to add it to my file.

Kenneth B. Lloyd
74 Elmira St. S.W.
Washington 24, D. C.

## Material Handling Problem?

In the Material Handling section of your May 28 issue, the articles, "Integrated Handling" (page 106) and "Report on Bulk Handling" (page 114), were particularly apropos since we are emphasizing improved material handling in our division. We would appreciate three reprints.

J. B. Ferguson
Project Superintendent
Foundries & Pattern Shops
Allis-Chalmers Mfg. Co.
Milwaukee

## Lauds Tool Steel Guide

"A Guide to Tool Steels and Carbides" (Mar. 12), is believed by one of our plant engineers to be one of the most complete guides he has ever seen. We would appreciate having several copies here in the shop.

J. L. Zuchnik
Purchasing Agent
Modern Machine & Tool
Bay City, Mich.

## STEEL To Appear in Thesis

I am writing a thesis concerning automation and the Guaranteed Annual Wage for a master of science degree at the Newark College of Engineering.

STEEL has been of value to me as a source of background and reference data. I would appreciate permission to quote from the following issues: Dec. 23, 1946, page 39; Jan. 23, 1954, pages 92-94; and Apr. 5, 1954, page 60.

Leonard Worthman
210 Gold St.
North Arlington, N. J.

• *We are glad to grant permission.*

# How to IMPROVE your production BATTING AVERAGE

You'll lead the league when you switch to CIMCOOL®, the radically new and different cutting fluid. Here are three ways that CIMCOOL Standard Concentrate can improve your production batting average:

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- **CIMCOOL IS CLEAN,** doesn't soil clothing or hands. It contains no skin irritants. It leaves no slippery film on shoes, floors, machine or work. It can't smoke, can't burn, and virtually eliminates rancidity and foul odors.

For full details on CIMCOOL Standard Concentrate—and on the entire family of CIMCOOL Cutting Fluids—just contact us. Wire, write or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

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## CIMCOOL CUTTING FLUIDS

CIMCOOL **Concentrate**—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.

CIMCOOL **Tapping Compound**—Permits the use of highest tapping speeds and increases tap life amazingly.

CIMPLUS The transparent grinding fluid with exceptional rust control. Also used for machining cast iron and [illegible] a water conditioner with CIMCOOL Concentrate.

CIMCUT **Base Additive**—For jobs requiring an oil-base cutting fluid. Added to mineral oils, it gives an economical mix for higher speeds and feeds.

CIMCOOL **Bactericide** — The most effective agent yet developed to overcome rancidity and foul odors.

CIMCOOL **Machine Cleaner** — The two-phase non-corrosive cleaner that removes grit, dirt, slime and oil.

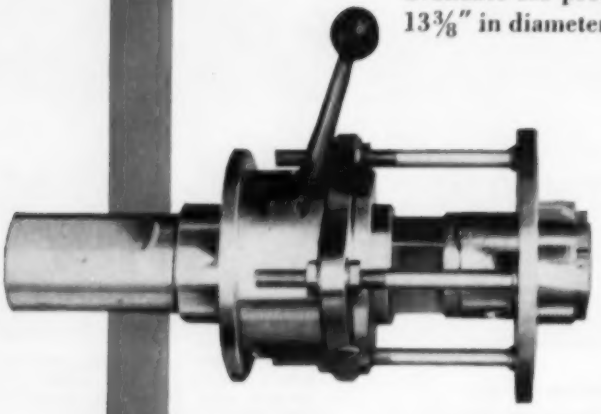
**CIMCOOL Cutting Fluids** *for* **100%** *of all metal cutting jobs*

PRODUCTION-PROVED PRODUCTS OF THE CINCINNATI MILLING MACHINE CO.

# LANDIS Collapsible Taps

Sensitive Collapsing Action

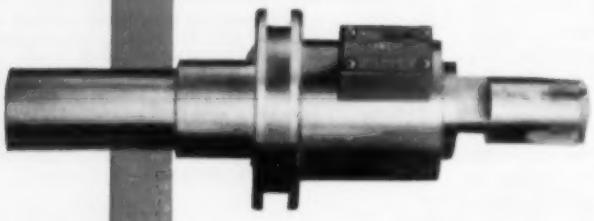
**The design of LANDIS Collapsible Taps** reduces tool wear, "torn" threads and tapping time by permitting direct removal from the workpiece without reversing or "backing out". The sensitivity of this "collapsing action", which automatically withdraws the chasers from the completed thread, assures uniform thread lengths and threading to a shoulder with safety. Various sizes of LANDIS Taps are available for producing straight or tapered threads from 1¼" to 13⅜" in diameter.



*Stationary Tap*

## ALT TAPS for straight threads

These taps feature a rugged construction and design simplicity which enable maximum chaser rigidity. The same tap may be used for either stationary (shown) or rotary application. Tapered threads can be tapped using chasers cutting across their entire width.



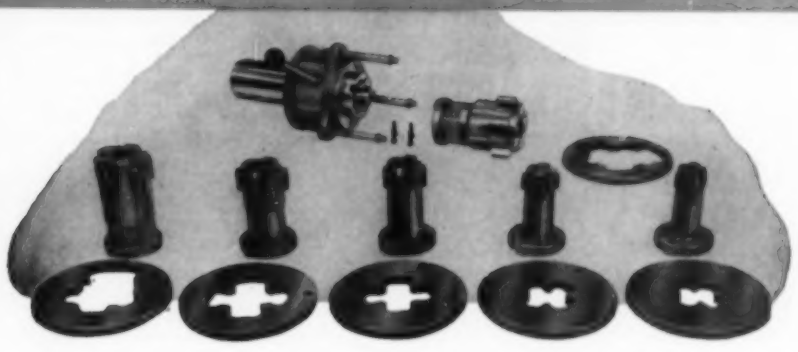
*The Rotary Tap*

## LL TAPS for tapered threads

The thread taper is produced by mechanical receding action of the chasers during threading. This action reduces cutting strains by restricting cutting action to the chaser throat or chamfer section. As little or no "cold working" can result, LL Taps are ideally suited for tapping tapered threads in stainless steel. These taps will also produce straight threads, and are available for either stationary or rotary applications.

Sensitive Collapsing Action

Straight or Tapered Threads Rotary or Stationary Use



## Wide Range Coverage

Detachable heads are a feature of all LANDIS Collapsible taps. This design allows tapping a wide range of thread diameters with minimum tooling—for example, the 3ALT body using 6 different heads will tap all diameters from 1¼" to 3¼". Each tap head itself has a wide threading range—the 1½" head will thread from 1⅜" to 1⅝", the 2" from 1⅞" to 2-5/16", the 3" from 2¾" to 3¼".

## Maximum Rigidity

The basic design of all LANDIS Tap Heads assures maximum bearing support between the chaser, plunger and tap head body. In the cross-section illustration, note the heavy metal sections which provide rigidity to the chasers and plunger, particularly at the points where cutting strains are transmitted.

## Size Adjustment Ease

All LANDIS Taps are designed so that they may be quickly adjusted approximately 1/32" over or under the nominal chaser size. The ratchet-type size-adjusting screw is conveniently located in the front of the tap. The movement of one ratchet tooth provides a self-locking diametrical adjustment of .001".

**LANDIS *Machine* COMPANY**

WAYNESBORO • PENNSYLVANIA • U. S. A.

430-C THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT - CUTTING - TAPPING - GRINDING - ROLLING

Straight or Tapered Threads Rotary or Stationary Use

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CAN PROFIT WITH
# Roylyn
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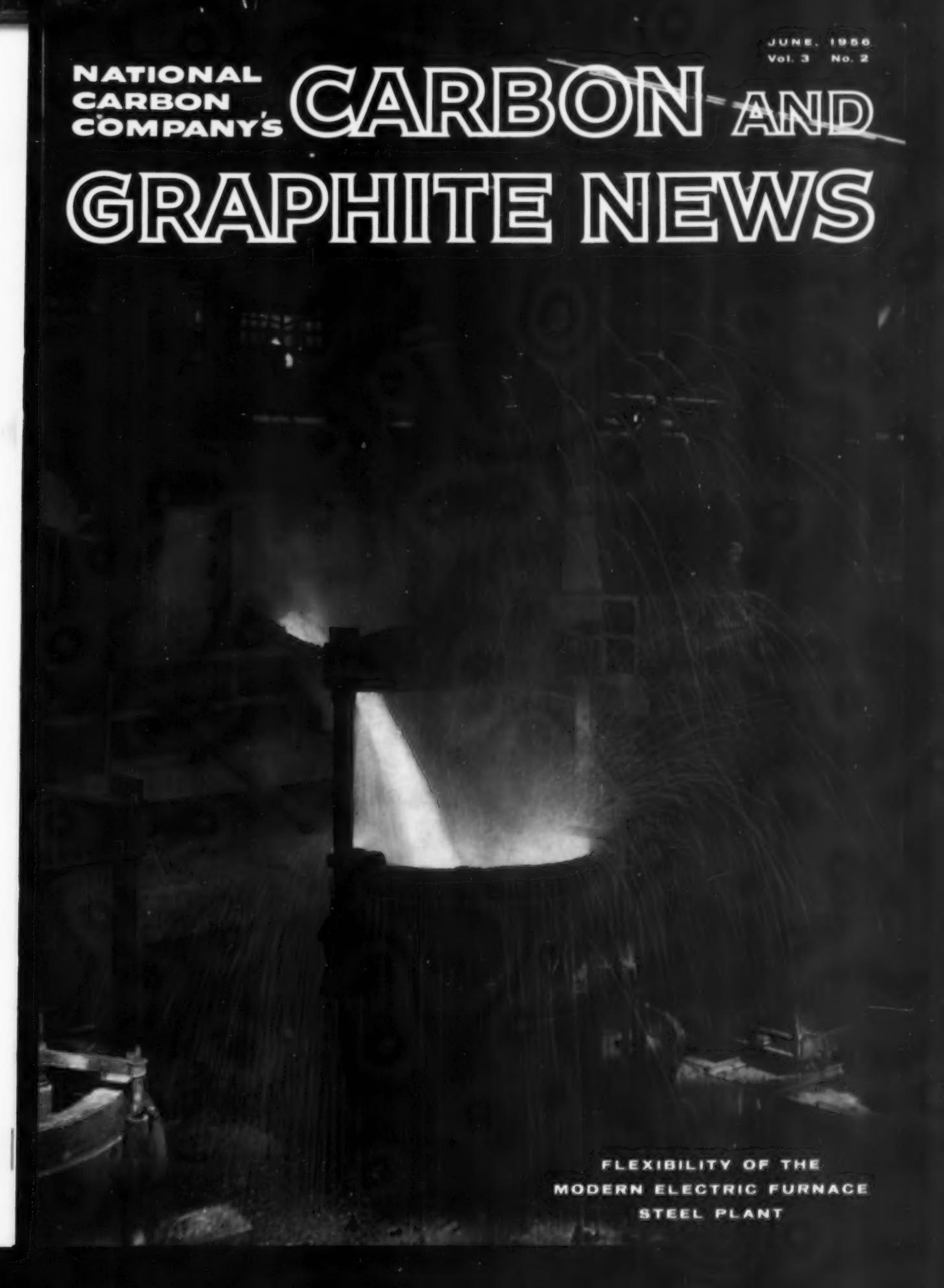
JUNE, 1956
Vol. 3 No. 2

NATIONAL CARBON COMPANY'S

# CARBON AND GRAPHITE NEWS



FLEXIBILITY OF THE MODERN ELECTRIC FURNACE STEEL PLANT

**Charging** — the electric furnace takes all forms of scrap . . . starts up and shuts down at a moment's notice . . . has low initial and operating costs that yield quickest return on investment dollar.

Advertisement

# FLEXIBILITY—
# 99 hours from order to finished product

ON the basis of flexibility alone, the electric arc furnace is a contender for the title of number one tool of modern steelmaking. No other method of steel production offers such a wide variety of advantages:

- Ease and speed of start-up and shut-down — adapts instantly to market conditions.
- Maximum latitude in slagging practice — widest variety of product.
- Less space per ton of capacity — lower plant investment.
- Maximum equipment availability — wider distribution of fixed costs.
- Low initial cost, low operating and labor costs — quickest yield on investment dollar.
- Adapts to custom or production runs — handles large and small orders with equal facility.
- Utilization of all types of scrap — lower cost of metallics.
- Top quality of product from stainless grades to carbon steels — improves competitive position.

Growth of electric furnace output during the last ten years — 80% of which is in the field of carbon steel production — points to the many advantages the arc furnace process offers all steelmakers, both in integrated and non-integrated plants.

A typical speciality mill such as Rotary Electric Steel Company in Detroit, Michigan, is actually a closely knit unit, each of whose appendages is highly sensitive to the requirements of its function within the whole. The efficiencies of a manufacturing assembly line are present, but obscured to the inexperienced eye by the magnitude and scope of the operation.

What seems a ponderous, even a leisurely undertaking is really a network of split-second coordinations. It must be so. In the electric furnace steel industry, where the wage bill is a smaller percentage of operating cost than in most industries, lost product — even more than lost man-hours — means big money. No effort is spared to make every melt as perfect as technology and experience can insure.

How can the relatively few electric furnace steel-mills in this country turn out the huge tonnages of finished and semi-finished product that are needed to supply thousands of processors, finishers, fabricators, assembly shops and parts and products manufacturers?

**Melting** — short melt cycles — from 5 to 7 hours — make the electric furnace equal, in output, to an open hearth of several times its nominal capacity. Electrics occupy less space, provide maximum equipment availability . . . wider distribution of fixed costs.

**Tapping** — electrics assure top quality product from stainless grades to carbon steel . . . improve competitive position through greater adaptability to market conditions . . . offer maximum latitude in slagging practice . . . widest range of product.

The answer lies in their *flexibility*. Flexibility, not only to operate at a constantly changing percentage of capacity to suit changing market conditions; but the ability, as well, to make that operation serve the most widely divergent and changing requirements of individual customers.

**Let's say you're manager** of a jobbing machine shop in the Detroit area, turning out specialities from stainless, alloy and carbon bar stock. Suddenly, you're up to your belt buckle in orders and nearing the end of your raw materials inventory which is

**Teeming** — cautiously the high quality, electric furnace steel is poured from ladle to ingot mold. Ceramic hot tops insure a sound ingot with minimum crop loss.

never very large. You can't wait for the mails and for ordinary processing of your inquiry. You are faced with the costly prospect of idle men and machines.

**You call Rotary Electric.** The TIME is 10:00 AM. In a matter of minutes, your order is analyzed by the Order Service Department. First, inventory is checked — nothing available in billet form for your job.

Next, the current melt schedule is investigated — there is a heat of suitable analysis due to be poured the following day with sufficient overage to make a part shipment on your 20-thousand pound order. Now we're getting somewhere! The TIME is 10:07 AM.

**The order is written** in a specially developed business machine order section which types and codes all pertinent information

**Soaking Pit** — Slowly the ingot rises from its bath of fire, properly heat-conditioned for the next operation.

available at this time, from date of order to the data needed for automatic invoice preparation. This formerly time-consuming paper work now requires just nine minutes. The TIME is only 10:16 AM.

**From here on,** the order travels with the steel. The Metallurgical Department processes it, entering instructions from previous orders, including the chemistry of the steel, sequence of operations, special finishes, packaging and shipping instructions. The TIME is 10:20 AM. Simultaneously, the Production Department makes a note to remove this quantity of steel from inventory and the Scheduling Department arranges for rolling the steel which is coming through early the following morning.

**After careful appraisal** of other mill commitments, every possible readjustment of the schedule is made to accommodate this emergency order. The ingot is poured at 12:05 Midnight. By 8:10 AM of the second

day, it has left the soaking pit. Quickly it passes through the blooming mill, is pickled, conditioned, reheated and rolled into a bar by 8:00 that evening.

**Annealed and ready for cold finishing** 32 hours later, the order is inspected and shipped at 1:00 PM of the fourth day – exactly 99 hours from time of the telephone call and starting from scratch. The remainder of the order will be shipped two weeks from date of receipt.

***That's how the flexibility*** of the electric furnace steel mill works for its customers to contribute its giant share to the prosperity and comfort of the consuming public.

**Blooming Mill** — the ingot is rolled into a billet . . .

. . . which becomes a smaller and smaller square and, finally, in the bar mill, a finished round.

**Annealing** — Here normalizing temperatures ease the stresses set up by mill-work . . . prepare the finished bar for ultimate machining, forming, forging or welding operations. Once again, flexibility of the electric furnace steel shop proves its ability to deliver the goods — *fast!*

All photographs courtesy of Rotary Electric Steel Company, Detroit, Mich.

*The term "National" is a registered trade-mark of Union Carbide and Carbon Corporation*

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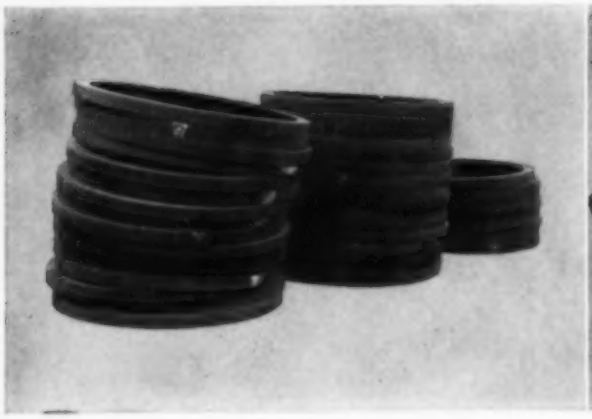

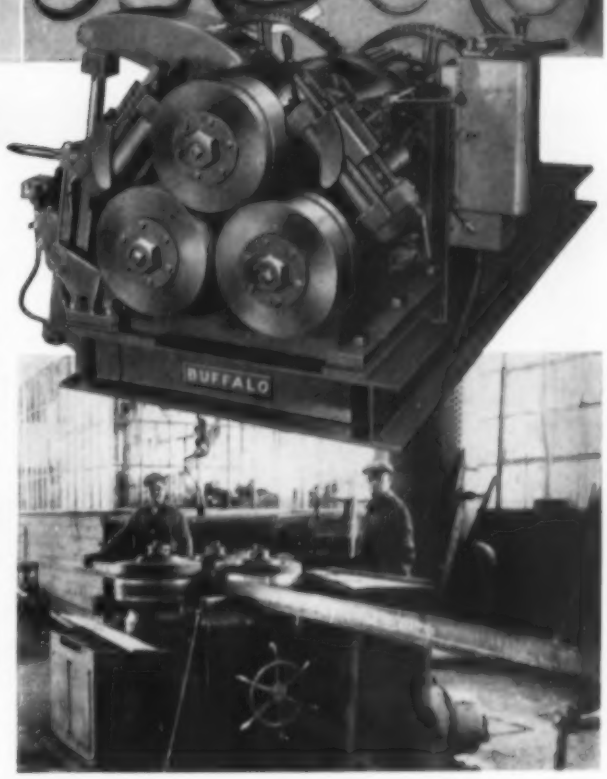


# "BUFFALO" BENDING ROLLS DO JOBS LIKE THESE IN MINUTES!

Pictured here are just a few of the curved shapes you can cold-roll quickly, accurately and cheaply with "Buffalo" Bending Rolls. For example, rings can be mass-produced from standard structurals coiled by a Bending Roll. Many shops form ring gear blanks very economically this way. Rolls are easily changed for varying setups and different structural shapes. "Buffalo" Bending Rolls are available in sizes to handle everything from the heaviest work down to the smallest members bent in fabrication shops. Write for Bulletin 352 and see the "Q" Factor* features for convenience, durability and economy that go into these "Buffalo" machines.

NEW "BUFFALO" HYDRAULIC BENDING ROLL. Upper roll is quickly and effortlessly positioned or released hydraulically for important setup time savings. Write for details on this popular new feature!

**The "Q" Factor—the built-in Quality which provides trouble-free satisfaction and long life.*

ESTABLISHED 1877 "Buffalo" MEMBER NMTBA

**BUFFALO FORGE COMPANY**

158 Mortimer Street, Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING • PUNCHING • SHEARING • BENDING

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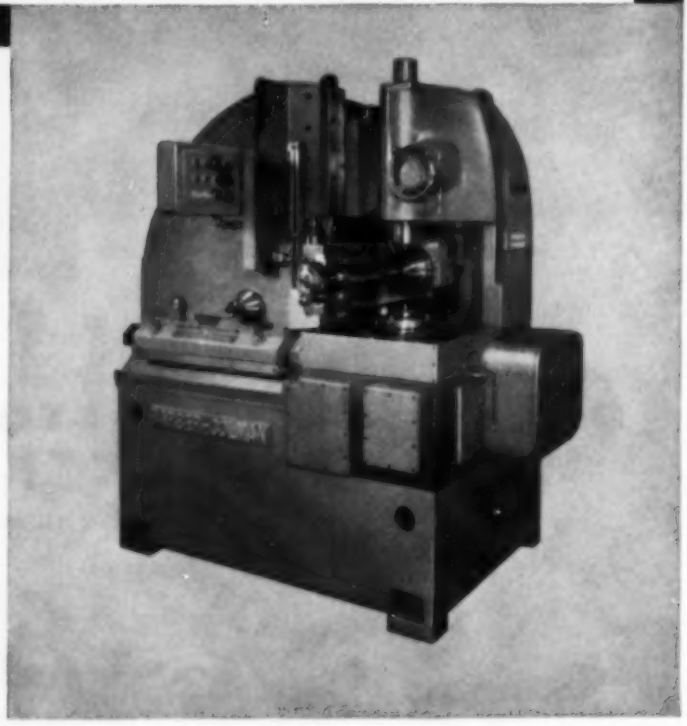
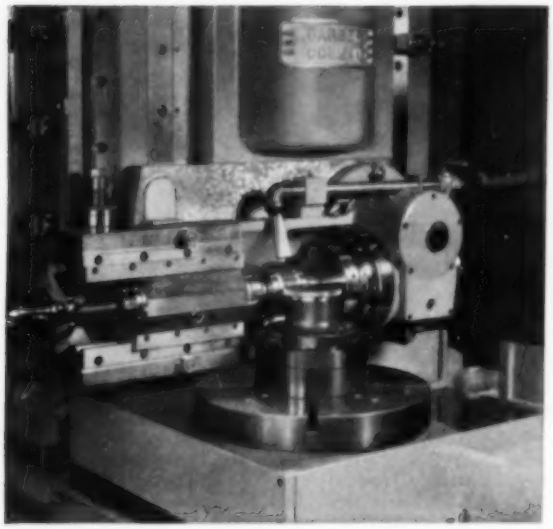
# a new concept of gear accuracy!

*Barber • Colman Builds World's Most Accurate Hobbing Machine* ✳

✳ **First hobbing machine ever guaranteed to cut gears within 10 seconds angular error**





Barber-Colman has designed and built, in collaboration with Sperry Gyroscope engineers, a new type of hobbing machine which hobs without any further finishing operation, gears for the most accurate radar, navigational and computing equipment. This machine is known as the "Ultracision" Hobbing Machine and is so accurate that gears cut by it will transmit motion within 10 seconds of true angular rotation. This is equivalent to .0001" on 4" diameter, which is the only size that has been thoroughly investigated at the present time. This means that the combination of lead, profile and spacing errors measured over non-adjacent teeth cannot exceed 10 seconds of true angular displacement at any diameter along the involute.

In order to arrive at this degree of precision, it has been necessary to provide new methods of positively checking such accuracy. Sperry engineers utilize theodolites and auto-collimators in conjunction with pneumatic, electronic and mechanical gaging equipment which assures accurate measurement within millionths of an inch.

**the machine**

To produce gears of this accuracy, many new and unusual features have been incorporated in the hobbing machine. The greatest care in manufacture and assembly has been used for all parts. All vital surfaces on the machine are scraped within .0001" per foot, and even the covers are scraped to fit the scraped portions of the bed casting to prevent entry of foreign matter.

Since the machine is designed to cut only spur gears, the feed drive is independent of the main drive. Capacity of the machine is 10" diameter blanks, 6" maximum length of hob carriage travel, and maximum rated pitch capacity of 32 DP. Drives to the work and hob spindles have been made as short as possible to minimize any twisting and vibration. An extremely accurate index worm and gear are mounted in ultra-precision taper roller bearings. Except for the index change gears, the gear train between the main drive shaft and the index worm contains only a worm and worm gear, and a pair of 90° helical gears.

The basic machine weighs 11,000 lbs., (with controls 13,800 lbs.) to provide the rigidity necessary for this exceptional accuracy. Another feature for increased rigidity and accuracy is the elimination of a hob slide. The hob is mounted directly on an expanding arbor, and shifted on this arbor, rather than by means of a hob slide.

Adjustments are provided for trueing the hob spindle within a few millionths of an inch. Both hob spindle and outboard support are mounted in ultra-precision taper roller bearings.

**the hobs**

To attain extreme profile accuracy on the gear teeth, Barber-Colman also has developed a new class of hob called "Ultracision", and made to limits of .00008" lead variation in one axial pitch, and .00015" in 3 axial pitches. These limits are just half of those for Class AA hobs. These hobs are ground and have larger than standard diameters to permit a greater number of hob teeth for very fine finish on the gear tooth profiles. Wide hubs and a 2" diameter straight bore provide maximum rigidity for the hob.

The development of this new concept in gear accuracy — the finest limits of gear accuracy ever obtained on a production basis — will eventually reflect in a higher standard of quality for gears produced on standard production hobbing machines. You are invited to submit your gear specifications and problems for analysis and recommendations by our engineers. Detailed information on the new "Ultracision" Hobbing Machine is available on request.

**BARBER-COLMAN COMPANY**

696 ROCK STREET • ROCKFORD, ILLINOIS

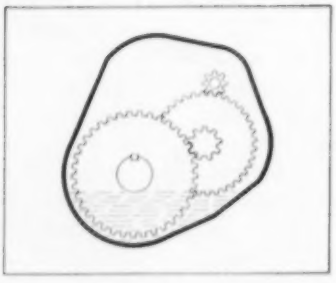
*Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines*

BARBER COLMAN

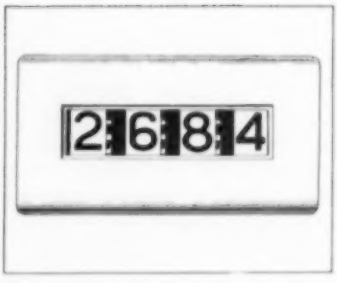
# 2 New CINCINNATI PRESS BRAKES

**THIRTY TON - - - - - 2 SERIES**
**FIFTY TON - - - - - 3 SERIES**

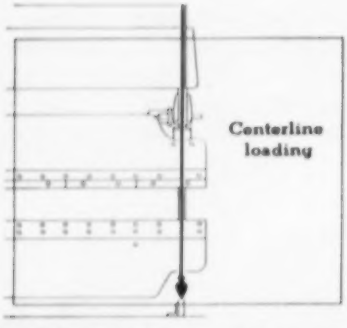
Front controlled, variable speed drive, 20 to 60 strokes per minute.



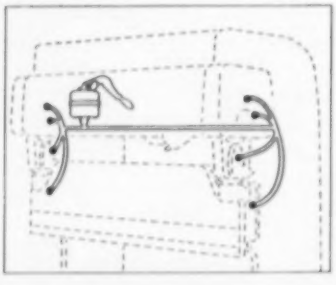
Completely enclosed transmission, running in oil.



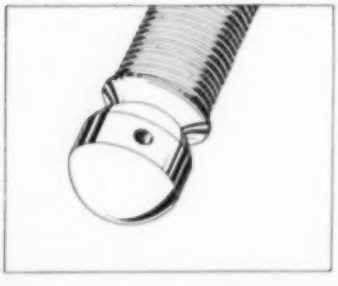

Two micrometer indicators, one at each end of the ram—easy to read and accurately record the amount of adjustment and tilt.




Centerline loading prevents weaving of the housings and insures accurate bends.



Centralized pressure lubrication system.



Ball end on the ram adjusting screws permits tapering of the ram for fade-out work.

**THE CINCINNATI SHAPER CO.**

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

## 2 SERIES

**This new 2 Series Cincinnati All Steel Press Brake has a capacity of 14 gauge x 6′ mild steel.**

**Look at these unusual standard features:**

**2½″ stroke—12″ shut height—9″ throat.**

**Distance between housings 5′-2″—overall die surface, 6′-0″.**

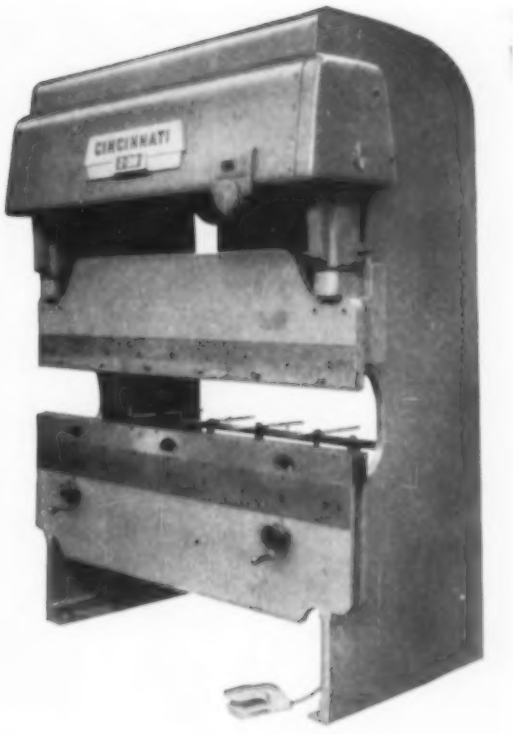
**Front controlled, variable speed drive, 20 to 50 SPM. 4″ manual ram adjustment including ram tapering adjustment for fade-out work (power adjustment available as extra feature).**

**Bronze swivel end-guide bearing for accurate endwise alignment, even when tilting ram.**

**Brushless electro-magnetic brake and clutch.**

**Deep bed and ram, planed and drilled for 5¾″ angles.**

**Micrometer indicators on both ends of ram for fast, accurate setting.**




## 3 SERIES

**These new 3 Series Cincinnati All Steel Press Brakes are built in two lengths and have a capacity of 10 gauge x 6′ mild steel. Investigate these unusual standard features: 3″ stroke—12″ shut height—12″ throat—distance between housings 6′-6″ or 10′-6″—overall die surface 8′-0″ or 12′-0″—front controlled, variable speed drive, 20 to 50 SPM.**

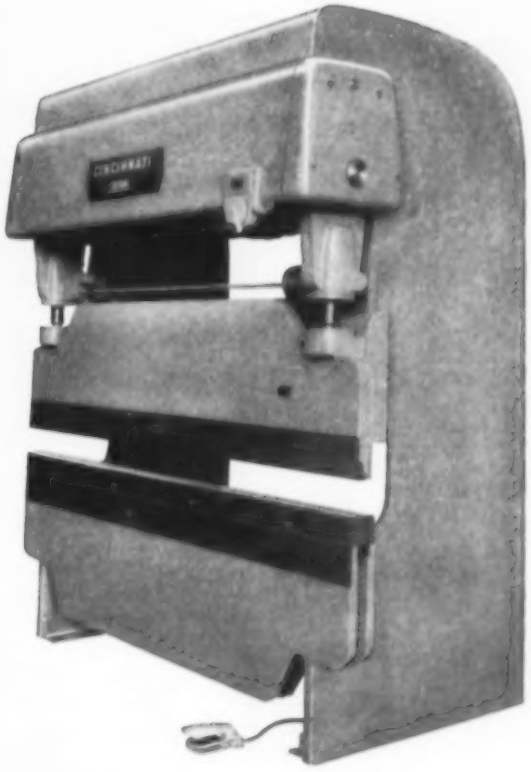
**5″ motorized ram adjustment, including ram motor and control, complete with ram tapering adjustment for fade-out work.**

**Bronze swivel end-guide bearing for accurate endwise alignment, even when tilting ram.**

**Brushless electro-magnetic brake and clutch.**

**Deep bed and ram, planed and drilled for 5¾″ angles.**

**Micrometer indicators on both ends of ram for fast, accurate setting.**



# Profit Launcher

Here's how 48¢ worth of Signode steel strapping can tie together 1¼ tons of drain tiles, so that they can be handled and shipped as a unit. This way saves time (and tile) for shipper, receiver and ultimate user. Unitizing with high-strength, low-cost steel strapping works equally well with castings, forgings, ingots, brick, sheets, cartons, products of many shapes and sizes. Your products, too, will cost less to handle, store, ship and receive when unitized the Signode way. Let a Signode representative show you how. Just write:

**SIGNODE STEEL STRAPPING CO.**

*2645 N. Western Avenue, Chicago 47, Illinois*

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In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto

# CALENDAR
## OF MEETINGS

**June 19-22, Aviation Distributors & Manufacturers Association:** Summer meeting, Grove Park Inn, Asheville, N. C. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: H. Donald Richards.

**June 20-22, American Marketing Association:** National conference and exhibit, William Penn hotel, Pittsburgh. Information: E. M. Strauss Jr., chairman, Aluminum Co. of America, Pittsburgh 19, Pa.

**June 24-26, Alloy Casting Institute:** Annual meeting, Homestead, Hot Springs, Va. Institute's address: 32 Third Ave., Mineola, N. Y. Executive vice president: E. O. Schoefer.

**June 24-27, Drop Forging Association:** Annual meeting, Homestead, Hot Springs, Va. Association's address: 419 S. Walnut St., Lansing, Mich. Executive vice president: Edgar L. Harden.

**June 25-26, Atomic Industrial Forum Inc. and Denver Research Institute:** National atomic energy conference, Denver Research Institute, Denver. Information: D. J. Scherer, Atomic Industrial Forum Inc., 260 Madison Ave., New York 16, N. Y.

**June 25-29, American Institute of Electrical Engineers:** Combined summer and Pacific general meeting, Fairmont hotel, San Francisco. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

**June 26-27, Porcelain Enamel Institute:** First annual conference, aluminum division, Hotel Cleveland, Cleveland. Institute's address: 1145 19th St. N.W., Washington 6, D. C. Secretary: John C. Oliver.

**June 28-July 1, American Coal Sales Association:** Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Association's address: 1625 Eye St. N.W., Washington 6, D. C. Executive vice president: W. W. Bayfield.

**July 19-20, Truck-Trailer Manufacturers Association Inc.:** Summer meeting, Edgewater Beach hotel, Chicago. Association's address: 710 Albee Bldg., Washington 5, D. C. Managing director: John B. Huise.

**July 25-28, National Tool & Die Manufacturers Association:** Summer meeting, Stanley hotel, Estes Park, Colo. Association's address: 907 Public Square Bldg., Cleveland 13, O. Executive secretary: George S. Eaton.

**Aug. 6-8, Society of Automotive Engineers Inc.:** National west coast meeting, Mark Hopkins hotel, San Francisco. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

**Aug. 21-24, Western Electronic Show and Convention:** Pan Pacific Auditorium and Ambassador hotel. Information: WESCON, 344 N. LaBrea Ave., Los Angeles 36, Calif.

**Sept. 7-9, Metal Powder Association:** Fall meeting, Homestead, Hot Springs, Va. Association's address: 420 Lexington Ave., New York 17, N. Y. Secretary: Robert L. Ziegfeld.

**Sept. 9-13, American Institute of Chemical Engineers:** Fall meeting, William Penn hotel, Pittsburgh. Institute's address: 120 E. 41st St., New York 17, N. Y. Secretary: F. J. Van Antwerpen.

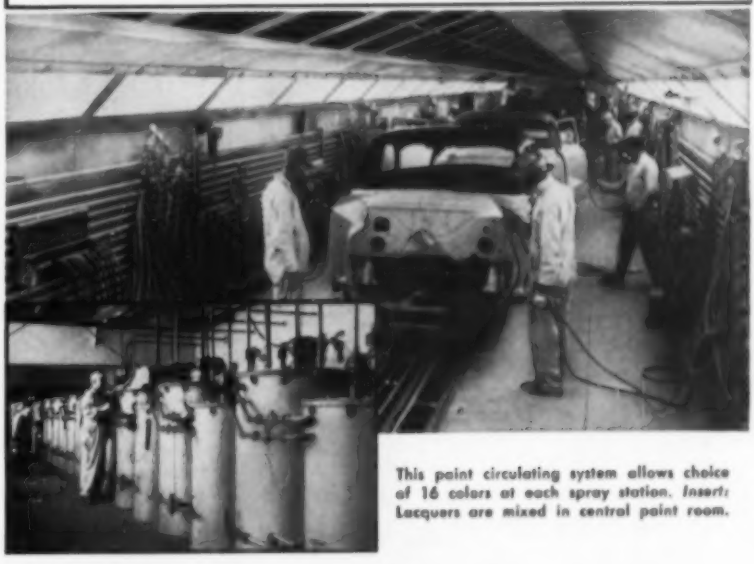
**Sept. 9-13, National Metal Trades Association:** Eastern plant management conference, Essex-Sussex hotel, Spring Lake, N. J. Association's address: 122 S. Michigan Ave., Chicago 3, Ill. Secretary: Charles L. Blatchford.

**Sept. 10-12, Allied Railway Supply Association:** Annual meeting, Sherman hotel, Chicago. Association's address: 1200 W. Chase Ave., Chicago 26, Ill. Executive secretary: Charles F. Weil.

**Sept. 10-12, Packaging Institute:** Annual forum, Hotel Statler, Cleveland. Institute's address: 342 Madison Ave., New York 17, N. Y. Executive director: Charles A. Feld.

**Sept. 10-13, Society of Automotive Engineers Inc.:** National tractor meeting and production forum, Hotel Schroeder, Milwaukee. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.


# WHAT'S NEW in paint circulating systems



This paint circulating system allows choice of 16 colors at each spray station. *Insert:* Lacquers are mixed in central paint room.

## Automatic paint circulating system guarantees Packard body parts will match

***Here's how a closed-type Binks Paint Circulating System insures Packard's quality control***

The lacquer sprayed by every paint spray gun in Packard's new Conner Avenue Plant in Detroit comes from a central source. This insures that parts painted in one end of the plant will perfectly match those finished in another section.

Paint for all operations is prepared under laboratory control in a fireproof paint mixing room which houses 22 dual tanks (each consisting of a separate mixing tank and supply tank), and 11 single units which combine a mixing and supply tank. Paint is mixed and maintained at 77° F. Color and viscosity are precisely controlled.

16 colors are piped from the tanks to all spray stations. In a matter of seconds, any sprayer can connect his gun to the line carrying the desired color. Uniform and measured paint delivery to each gun is assured by the use of Binks PM-103 Regulators. Atomizing air pressure is closely controlled by Binks AO-120 Oil and Water Extractors at each station.

The Packard paint circulating system allows 52 possible color combinations and is set up to apply 4 coats of lacquer in 2 or 3 tones. More than 400,000 gallons of lacquer are used each year.

Packard's choice of a Binks paint circulating system and Binks equipment is another example of how that company maintains "Complete Coordinated Cooperation" in all production.

***If your production setup*** has 2 or more spray stations using in excess of 50 gallons of paint each day, it will pay you to investigate this type of installation. The more paint you use, the greater your savings. To learn of the many other advantages of a Binks Paint Circulating System, see your jobber or distributor, or write directly to:

**Binks**
*EVERYTHING FOR SPRAY PAINTING*

**BINKS MANUFACTURING COMPANY**
3122-30 Carroll Avenue West, Chicago 12, Ill.

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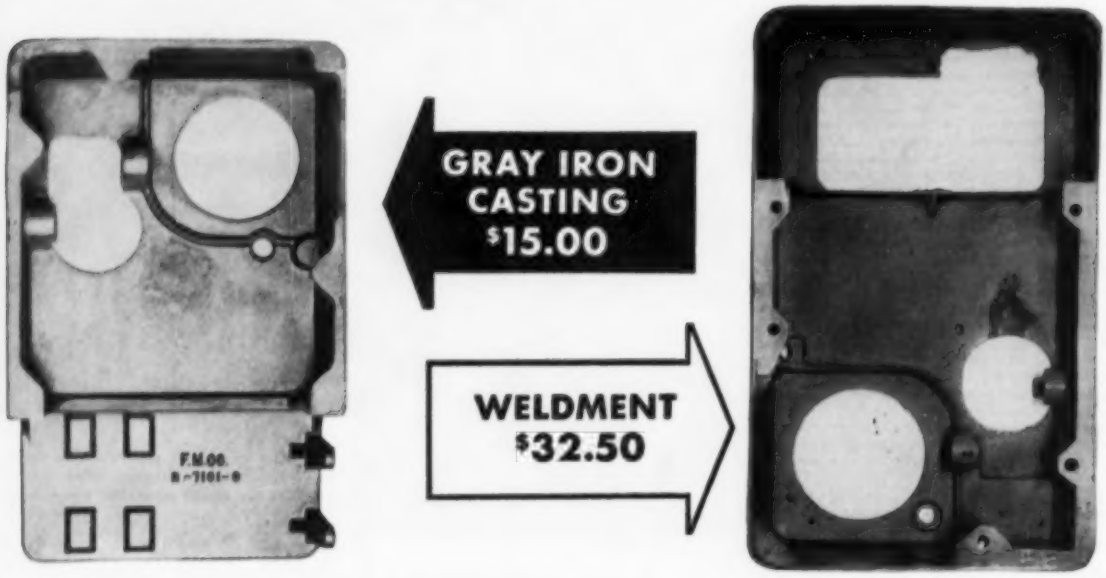
Case History No. 36 • SPLASH TRAY




# Pilot-Model Weldment points way to 53% SAVING IN GRAY IRON

**This symbol assures you the most for your casting dollar**

Here's why it pays to call in one of the more than 500 leading foundries displaying the Society symbol:

- The most recent technical and business information is available to each member through the Society to help you design better products at lower cost.
- The use of sound cost accounting procedures is recommended and encouraged among Society member foundries, assuring full value for your casting dollar.
- Improved castings result from the advanced techniques and the high sense of responsibility of Society members.

***MAKE IT BETTER WITH GRAY IRON***

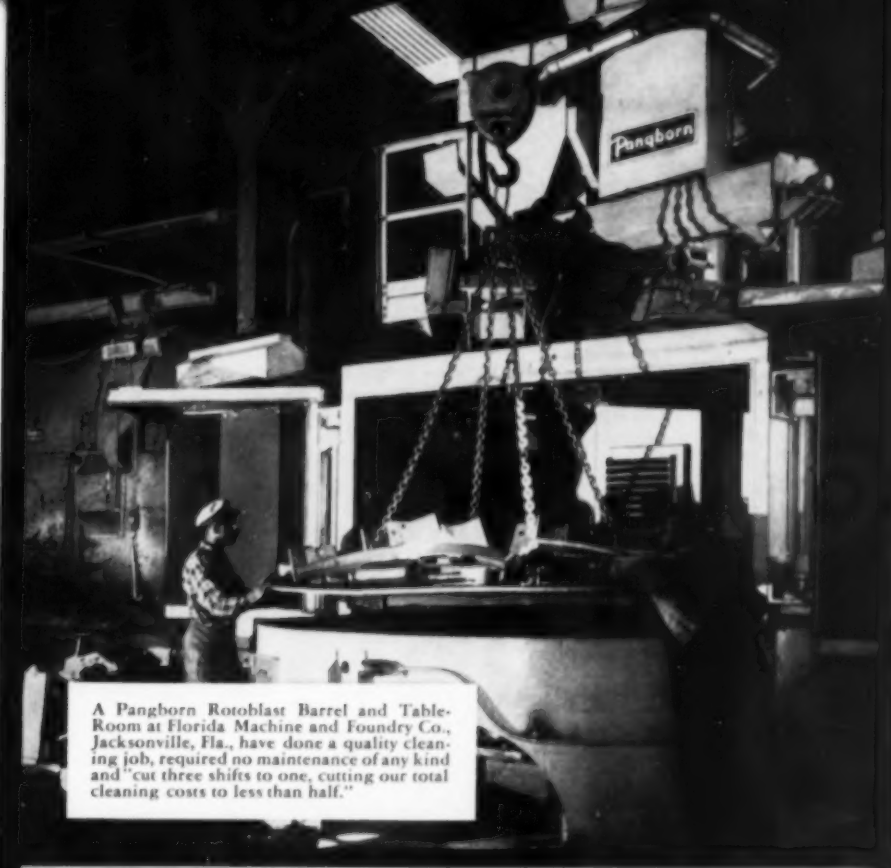
Admittedly, it's sometimes desirable to make pilot models by welded fabrication. However, when the model proves itself and is ready for production, you can usually make important savings by using *Gray Iron castings.*

In the above case, these splash trays were being fabricated and assembled with a bolted-on motor mounting bracket. Then Gray Iron castings were specified, and *savings amounted to $17.50 per tray!* The casting added desired rigidity, dampened vibration and provided more than adequate strength. Also, the motor mount—cast integrally—eliminated an assembly operation.

Perhaps there are examples in your own production setup where conversion to Gray Iron from a fabricated pilot model has been overlooked. Look at that part again, and consider the savings and other advantages to be gained by *casting* it in Gray Iron.

Write to the Society for technical answers to such questions, or for business information regarding castings. The Gray Iron Founders' Society, Inc., National City—East 6th Building, Cleveland 14, Ohio.

## GRAY IRON FOUNDERS' SOCIETY




A Pangborn Rotoblast Barrel and Table-Room at Florida Machine and Foundry Co., Jacksonville, Fla., have done a quality cleaning job, required no maintenance of any kind and "cut three shifts to one, cutting our total cleaning costs to less than half."

# Pangborn Rotoblast® cuts cleaning costs more than 50% at Florida Machine and Foundry!

## And cuts maintenance, labor and power costs at Gisholt!

Since Gisholt Machine Co., Madison, Wis., installed a Pangborn Blastmaster® Barrel, maintenance costs have dropped, labor costs are 33% lower and power costs are less than half those required by previous equipment!

The efficiency of a blast cleaning operation is determined by the cost *per ton of castings cleaned.* This overall figure incorporates many cost factors—labor, power, maintenance, speed, abrasive.

Pangborn Rotoblast cuts these costs! Pangborn Rotoblast cleans quickly and automatically . . . production goes up, power and labor costs go down. Pangborn Rotoblast boasts rugged construction and unique design . . . maintenance costs drop, downtime is reduced, abrasive loss is eliminated.

Total these savings and you'll find Pangborn Rotoblast gives you *lowest cost per ton of castings cleaned.* Choose the Pangborn machine best for *you* and slash operating costs!

Write today for Bulletin 227 to PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

# Pangborn

## BLAST CLEANS CHEAPER

Rotoblast Blastmaster® & Continuous-Flo Barrel

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## Only P&H AC/DC Welders give you

# 7 Welders in 1

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*plus quick, exact heat from Dial-lectric Control*

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Because of its flexibility, the P&H AC/DC Welder opens many new welding opportunities for large and small plants. It's so easy to use that even new men make good welds on "difficult" metals. There's a right size P&H AC/DC Welder for most needs. Capacities range from 7 amps to 675 amps. Write today for more information.

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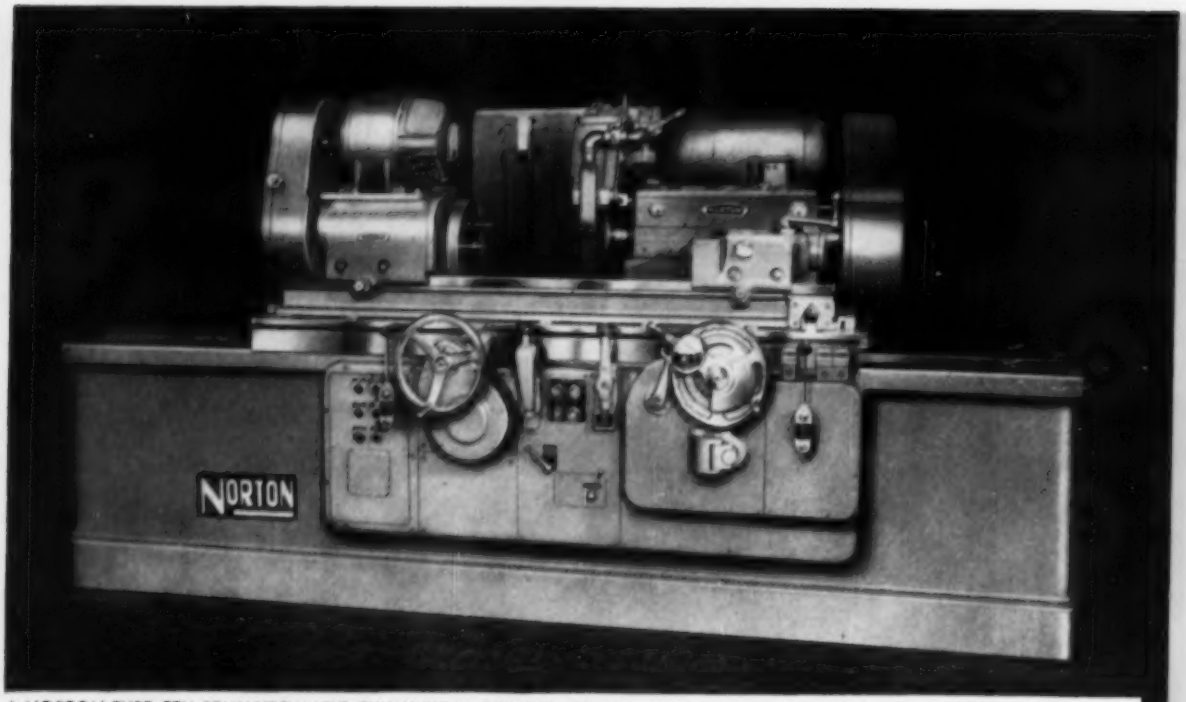



**A NORTON TYPE CTU SEMIAUTOMATIC CYLINDRICAL GRINDER.** The fastest, most economical and versatile grinding machine of its type. One-lever control of the automatic grinding cycle reduces the operator's duties to loading and unloading. Both the 6" and 10" Type CTU's are available as semiautomatics or as plain machines.

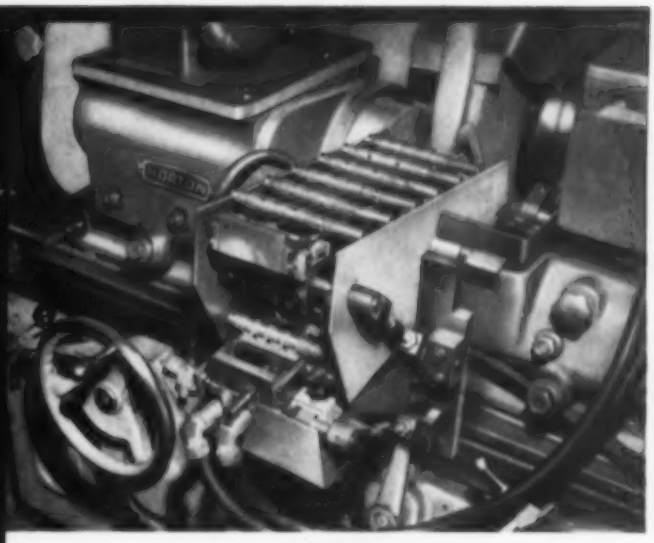
# Norton Type CTU Cylindrical Grinders are packed with features for...

Production line and job shop users report that Norton 6" and 10" Type CTU cylindrical grinders have doubled and tripled production, replaced several machines and eliminated costly extra operations.

That's because of the many time-and-work-saving "Touch of Gold" features — standard and auxiliary — available with these grinders.

Some of the expertly automated auxiliary features are described here. Check them carefully — and figure their value to your own cylindrical grinding operations. And remember: only Norton offers you such long experience in both grinding machines and wheels to bring you the "Touch of Gold" that helps you produce more at lower cost. For further facts, see your Norton Representative, or write to NORTON COMPANY, Machine Division, Worcester 6, Mass. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

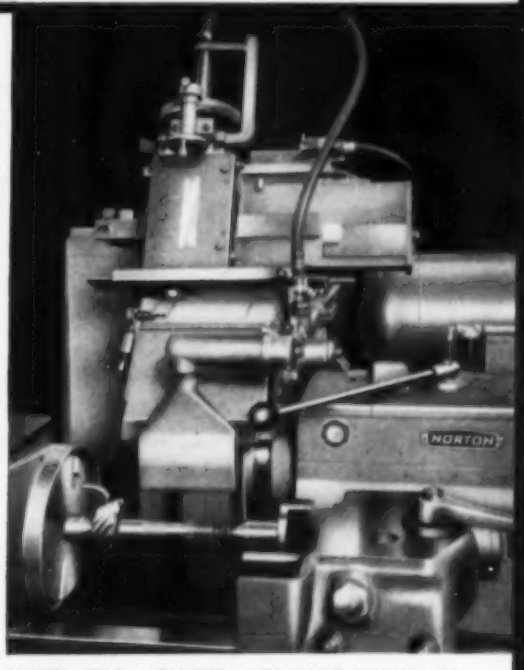
**THE SWIVALIGN* ELIMINATES CUT-AND-TRY.** Another Norton "Touch of Gold" development for faster, better, lower cost grinding. The SWIVALIGN Dual Electric Indicator, available for Norton cylindrical and universal grinders, enables operators to adjust the angular positions of swivel tables quickly and accurately, eliminating the usual cut-and-try guesswork. Featuring positive response and easy operation, this accurate instrument saves grinding time and money.



*RAIL TYPE*

*TURRET TYPE*

**YOUR CHOICE OF AUTOMATIC LOADING DEVICES.** Two types of Norton automatic loading devices are obtainable with 6" and 10" Type CTU semiautomatic grinders. The rail type loader is designed to handle a variety of small shafts. The turret type loader handles workpieces which must be chucked. Thanks to their steadily paced, automatic operation these Norton-developed loading mechanisms can be adapted to full automation. Or, they make it possible for one operator to tend a battery of machines, speeding production and cutting unit costs day after day.




**WHEEL HEAD MOUNTED AUTOMATIC TRUING OFFERS BIG ADVANTAGES.** A Norton automatic truing device, as shown here on a Type CTU grinder, quickly repays its original cost. It speeds up production, increases wheel life and increases diamond life. Also, it decreases the skill and effort required with hand truing. Operation is extremely simple. Once the original settings are made, all you do is push a button. Then the diamond automatically makes its round trip across the wheel face, at pre-determined speed and feed. Easy adjustments assure correct settings for each job . . . Another step forward in automatic grinding!

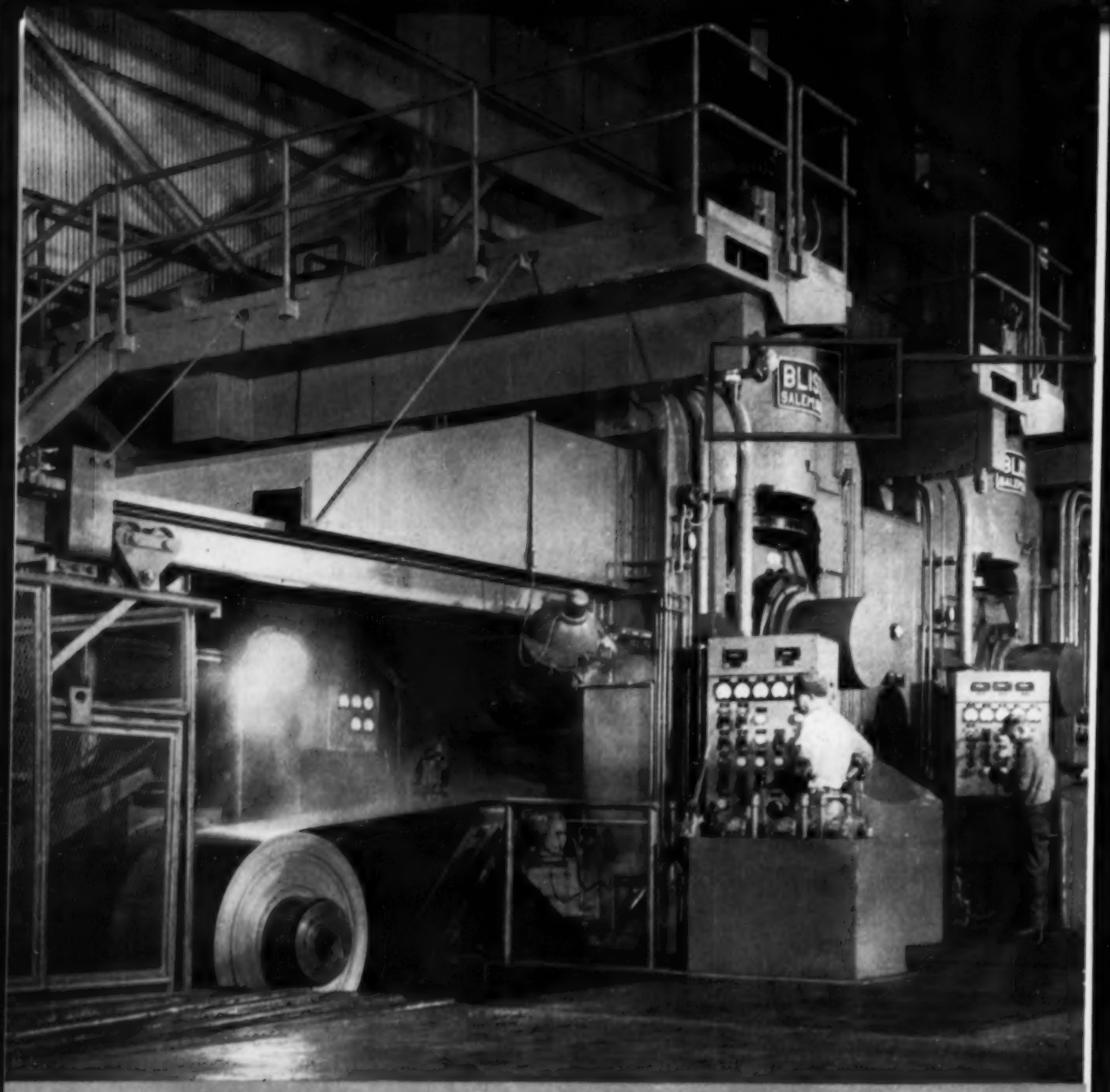
**NORTON**

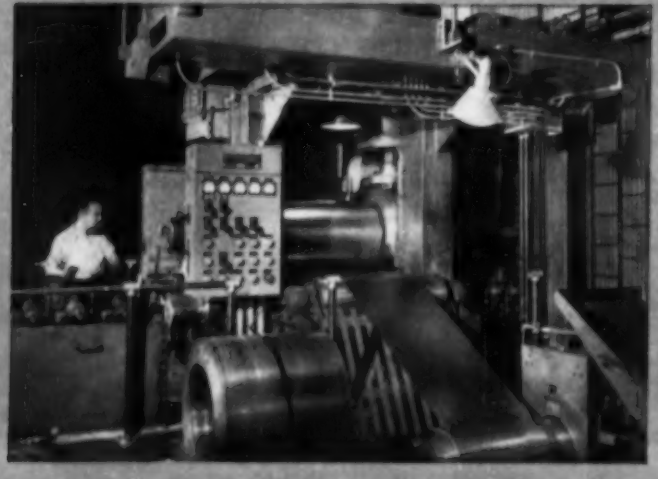
**GRINDERS and LAPPERS**

*Making better products . . . to make your products better*

*District Offices:* **Worcester • Hartford • New York Area, Teterboro, New Jersey • Cleveland • Chicago • Detroit**

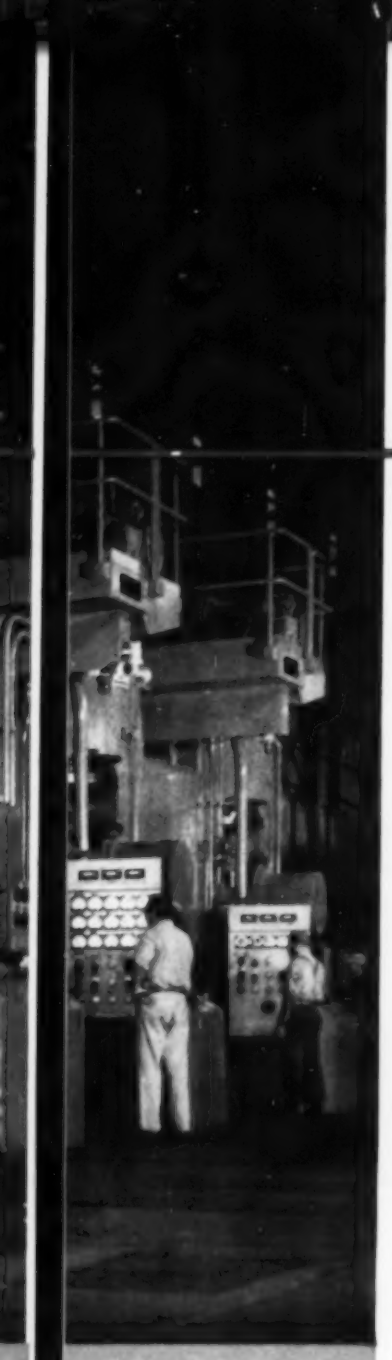
*SWIVALIGN — Norton trade name for Dual Electric Indicator for accurate measurements of swivel table adjustment.



**New Bliss 4-stand tandem mill** at Empire Steel. Each stand is a 19" and 51" by 52" four-high mill. All entry and delivery equipment, including tension reel, coil buggy and belt wrapper were also made and installed by Bliss. Many of the rolls were supplied by Bliss' Mackintosh-Hemphill Division.

**New Bliss 2-high 30" x 50" temper mill** processes much of the output from the tandem. Its rated speed and coil capacity are the same as the big mill's.



# Why Empire Steel picked BLISS mills for its new cold roll department...

Already known as a producer of hot rolled sheet and plate, Empire Steel Company, Mansfield, Ohio, has just completed a new cold roll department that ranks as one of the most up-to-the-minute in the country.

The key installation is a new Bliss four-stand tandem mill. Its 1866-feet-per-minute delivery speed on wide strip provides ample capacity for all Empire's foreseeable needs. A new Bliss single-stand two-high temper mill completes Empire's cold rolling facilities. Both mills are equipped with Bliss entry and delivery equipment capable of handling coils weighing up to 34,000 pounds.

Empire's selection of Bliss equipment was a logical one. Four years ago, Bliss engineered a complete hot strip mill for Empire, including the rebuilding of some existing equipment and the addition of completely new mills and accessories. The success of this modernization program had a strong influence on the company's decision to come to Bliss for its new cold rolling department.

Whether you need a complete new mill or advice about modification to your existing facilities, it will pay you to discuss your problem with a Bliss engineer. To get acquainted, why not write for a free copy of our 60-page Rolling Mill Brochure, Bulletin 40-A.

BLISS
SINCE 1857

*is more than a name . . . it's a guarantee*

**E. W. BLISS Company, General Office: Canton, Ohio**
**ROLLING MILL DIVISION: SALEM, OHIO**

*Plants at Canton, Cleveland, Salem and Toledo, Ohio; Detroit and Hastings, Michigan; Midland and Pittsburgh, Pennsylvania; San Jose, California. Representatives throughout the United States.*

*See what adhesives are doing today!*

A 3M ADHESIVE FASTENS DOWN THIS RUBBER MAT FOR KEEPS. IT'S CLEAN, QUICK AND EASY, MAKES NO MESS IN THE CAB INTERIOR.

# Dressing up the "doghouse"

How would you fasten the trim on this truck engine cover? The fastener must fight heat, stress and vibration. And it has to be able to hold this rubber mat tight year after year, for hundreds of thousands of punishing miles.

*Yet a 3M adhesive does the job.* This worker quickly brushes EC-882 on the painted "doghouse", presses the rubber mat in place. High-strength, fast-drying EC-882 grips immediately and for keeps. In addition, EC-882 bonds rubber weather strip to the cab's enameled doors and door frames.

Another 3M adhesive, EC-871, fastens fibrous glass insulation to the cab roof and vinyl-coated jute to back and side panels. After 15 years of using 3M adhesives, this manufacturer can't recall one case of adhesive failure.

**SEE WHAT ADHESIVES CAN DO FOR YOU!** Hundreds of 3M adhesives serve many varied industries. Consult 3M research. Call your 3M Field Engineer. For a free booklet and information write: 3M, Dept. 306, 417 Piquette Ave., Detroit 2, Mich.

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- He stocks exactly what you need, saving you time, paper work and storage space.
- He's a good man to know. Buy your Wickwire Rope and Slings from him. You'll find that the many valuable services he offers far outweigh any apparent price advantage you might gain by buying direct.

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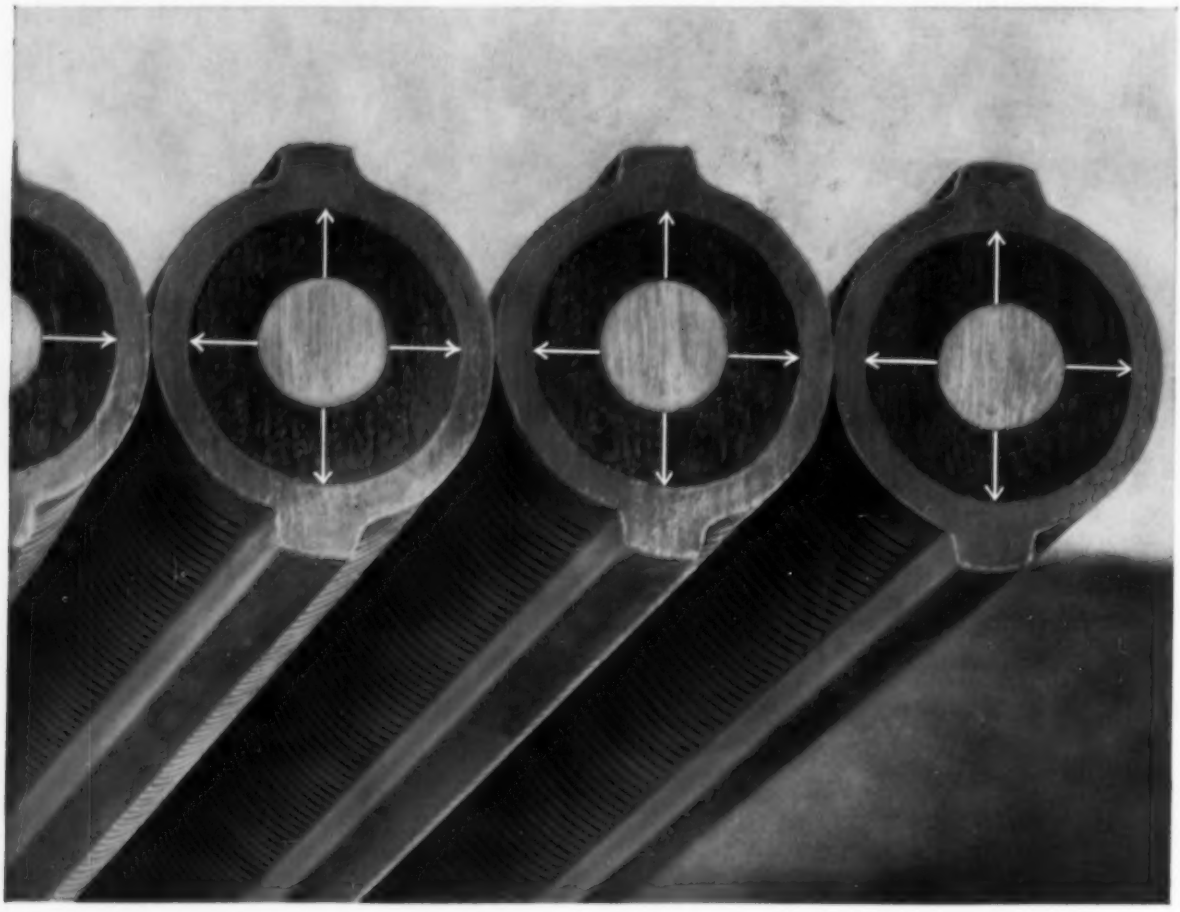
A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

3149

# EXIDE-IRONCLAD BATTERIES

**For electric industrial truck operation**



## Power tubes expand without shedding — preserve battery life

BATTERY FOR ELECTRIC INDUSTRIAL TRUCK. Exide-Ironclad Model TH. Write for Bulletin No. 5161.

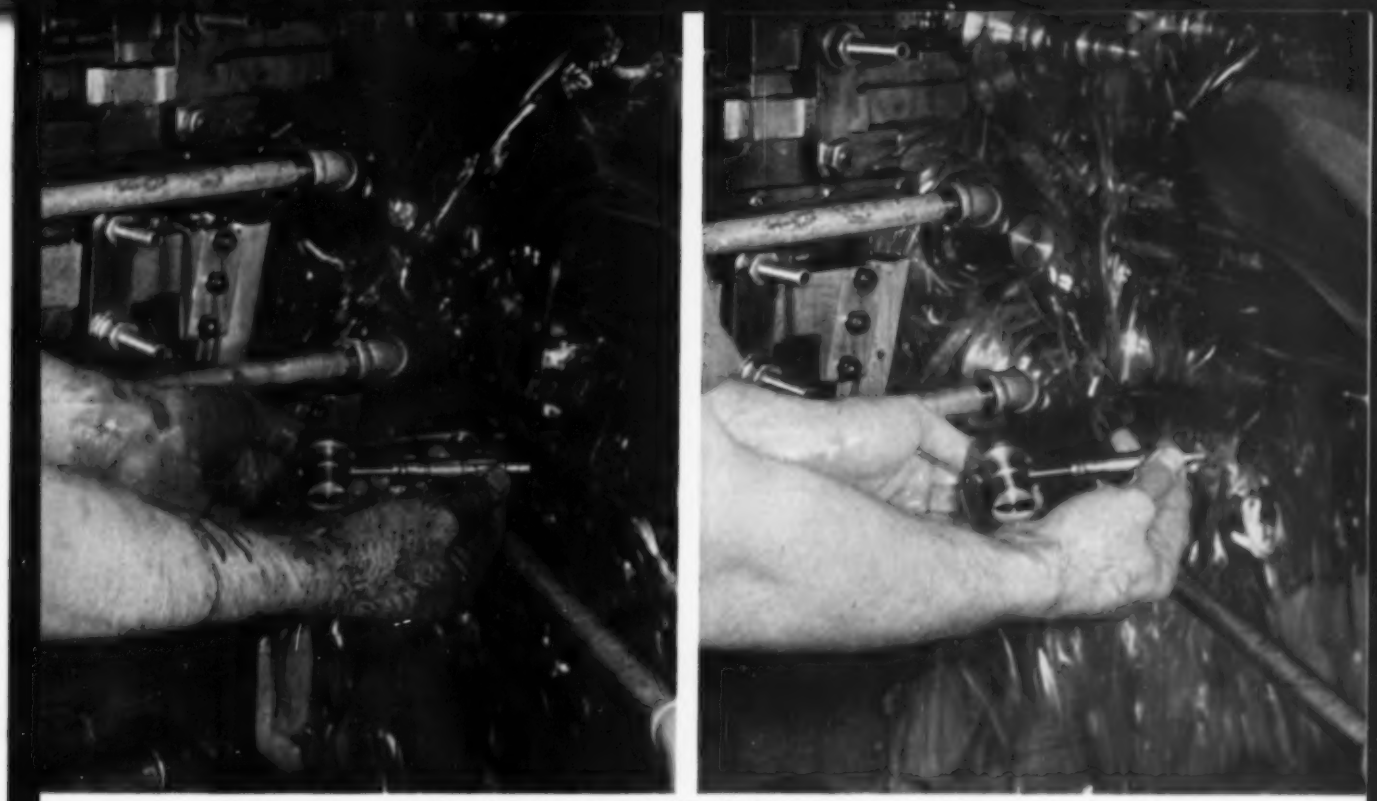
Every time you discharge a storage battery, the active material on the positive plates expands. But the plate grids don't expand. This is basic.

On most batteries, the expanding active material tends to shear off from the nonexpanding grid every time the action takes place. But this can't happen in the Exide-Ironclad Battery. The reason is simple.

Active material is formed concentrically around the spinelike grid and held inside the plastic tubes. Expansion is predominantly in an outward direction—hence no shearing. Active material remains firmly locked to the underlying grid structure. And the flexible plastic tubes yield and take up as needed.

This extra protection against shedding of active material is only one of the many reasons for the long life of Exide-Ironclad Batteries. When you order heavy duty batteries, or the equipment requiring them, be sure to specify Exide-Ironclad. Write for detailed bulletin. Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

Exide®



**Black cutting oil** (left) makes close control difficult. Operators dislike dirty operating conditions it creates. Close control is easier and workers are happier with transparent Sunicut cutting oil (right).

# WHY USE A BLACK CUTTING OIL WHEN YOU DON'T NEED IT?

**Sunicut oils give you better visibility without sacrificing machining efficiency.**

When trying to maintain close control over machines producing precision parts, operators can be handicapped by "black-oil blindness". It is hard to see the tools, the workpiece, and the finishes. Checking close tolerances is difficult when the graduations on micrometers and gauges are obscured.

Worse still, as the operator sees it, are the dirty working conditions caused by dark oils. His clothes get saturated with hard-to-remove stains, and his hands are black from one end of the shift to the other.

Transparent Sunicut oils help keep your operators happy and will make close control easier ...and transparent Sunicut oils will do the job with no sacrifice in machining speed or finishes.

To get the full story on Sunicut oils, see your local Sun representative, or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. I-41.

SUNOCO®

INDUSTRIAL PRODUCTS DEPARTMENT

**SUN OIL COMPANY** PHILADELPHIA 3, PA.

© SUN OIL CO.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

*For any machining or grinding operation . . .*

# THERE'S A SUN OIL THAT'LL GIVE YOU HIGH EFFICIENCY AND LOW OVER-ALL COST

No two machine shops have exactly the same problems when it comes to selecting cutting oils . . . even when they're running the same job. And, until somebody comes up with the truly universal cutting oil, you can't afford to disregard the importance of oil selection. Here's how Sun can help you.

First, Sun makes a complete line of emulsifying and straight cutting and grinding oils. Second, your Sun representative, backed up by field engineers, has the necessary practical experience to recommend the oil that will give you both high machining efficiency and low over-all costs.

For the full story about Sun's cutting oils, see your Sun representative . . . or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. I-42.

SUNOCO®

INDUSTRIAL PRODUCTS DEPARTMENT

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# BIRDSBORO creative engineering solves tough mill problems

DESIGNERS AND BUILDERS OF:

- STEEL MILL MACHINERY
- HYDRAULIC PRESSES (Metalworking and Extrusion)
- CRUSHING MACHINERY
- SPECIAL MACHINERY
- STEEL CASTINGS
- Weldments "CAST-WELD" Design
- ROLLS: Steel, Alloy Iron, Alloy Steel

If your new mill is still in the idea stage . . . If you have been thinking about modifying your present mill . . . If you have a production problem that can be solved by extensive experience and engineering ability . . .

Call in a Birdsboro representative to discuss your plans. In addition to his own knowledge, he has the entire Birdsboro staff on call and will gladly start the machinery that will put them to work on your job. In nearly every case, there are better ways to do it . . . and Birdsboro either already knows them or will help to find them for you.

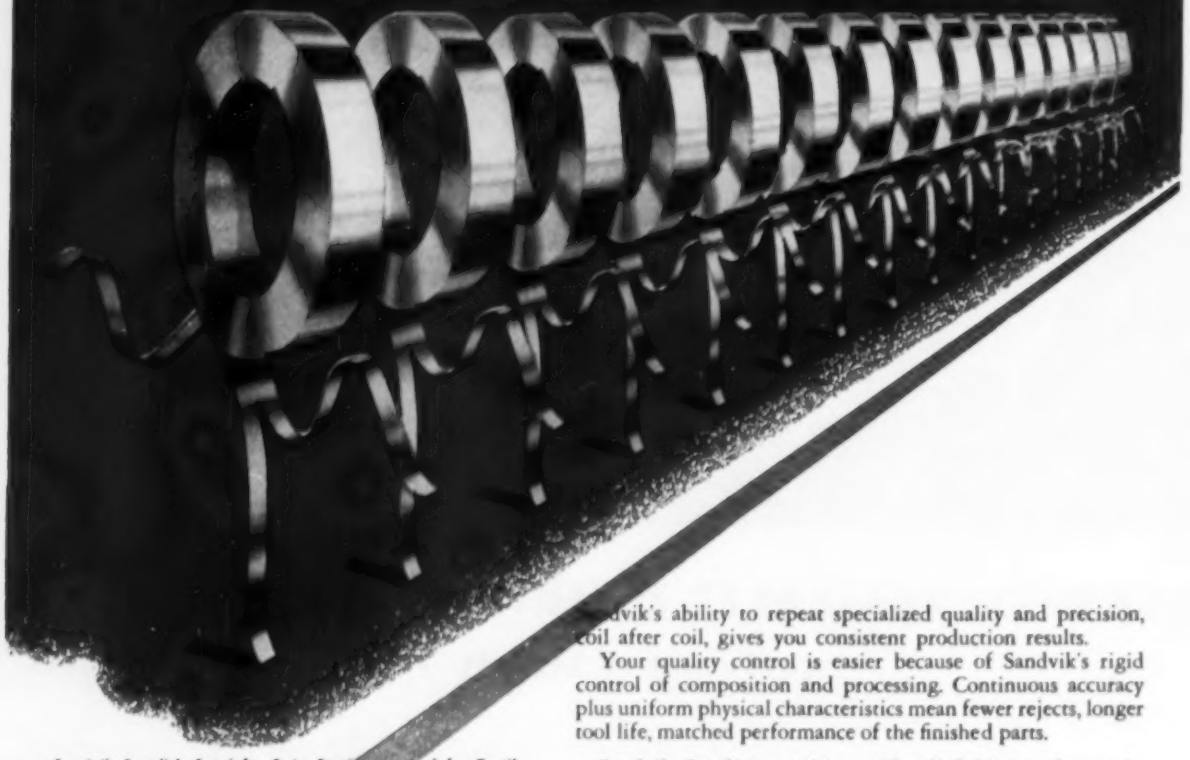
BIRDSBORO

BIRDSBORO STEEL FOUNDRY & MACHINE CO., Main Offices in Birdsboro, Pa. District Office: Pittsburgh, Pa.

New York Office: Engineering Supervision Co., 120 West 42nd Street, New York 36, N.Y.

# Sandvik Spring Steel's *Matched Performance*

## gives you continuous quality production



Sandvik's ability to repeat specialized quality and precision, coil after coil, gives you consistent production results.

Your quality control is easier because of Sandvik's rigid control of composition and processing. Continuous accuracy plus uniform physical characteristics mean fewer rejects, longer tool life, matched performance of the finished parts.

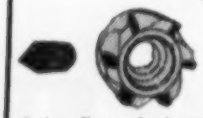
Sandvik Swedish specialty cold rolled high carbon strip steels are available:

- **In special analyses for specific applications.**
- **Precision-rolled in thicknesses to fit your requirements.**
- **In straight carbon and alloy grades.**
- **Annealed, unannealed or hardened and tempered.**
- **Polished bright, yellow or blue.**
- **With square, round or dressed edges.**
- ***Wide range of sizes in stock—also slitting facilities available.***

*Ask your nearest Sandvik office for further information or technical assistance.*

**Sandvik Swedish Specialty Strip Steels are used for Textile Machine Parts such as sinkers, needles, etc. • Band Saws (metal, wood and butcher) • Camera Shutters • Clock and Watch Springs • Compressor Valves • Doctor Blades • Feeler Gauges • Knives such as cigarette knives, surgical instruments, etc. • Razor Blades • Reeds • Shock Absorbers • A Wide Variety of Springs • Trowels • Vibrator Reeds • Piston Ring Segment and Expanders, etc.**

**SANDVIK *Coromant***
**CARBIDE TIPPED TOOLS AND BLANKS**



- In a wide variety of tools and blanks from stock—including many shapes and designs which have been considered "specials" before.
- In all standard grades with improved performance to suit a wide range of applications.
- In the new, time saving "Coromant Combination Cutter."

***From ore to finished product within the same company***

**SANDVIK STEEL, INC.**
**1702 Nevins Road, Fair Lawn, New Jersey**
**Tel. Fair Lawn 4-6200—**
**In New York City: WAtkins 9-7180**
Warehouses: Fair Lawn, N. J. • Cleveland • Los Angeles
Branch Offices:
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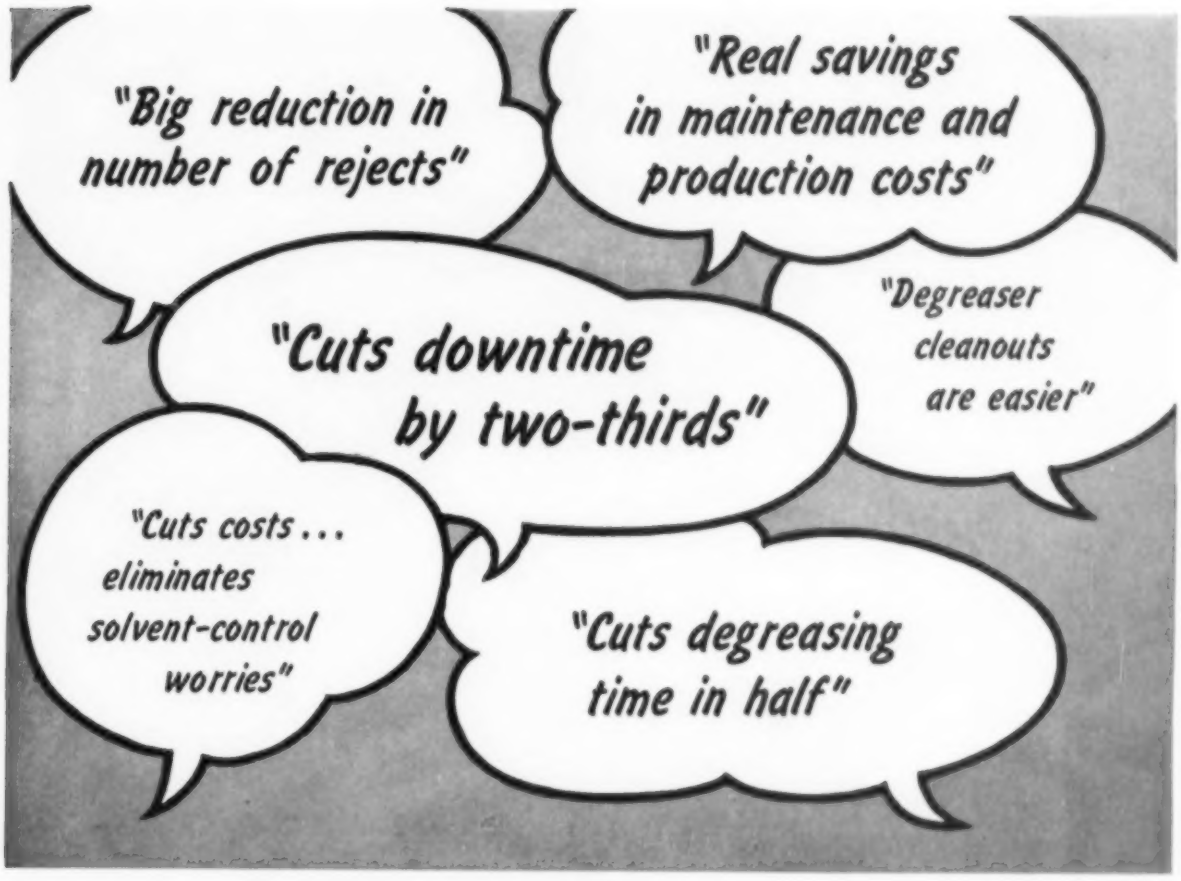
8650 Brookpark Rd., Cleveland 29, O., ONtario 1-3205
3609 E. Olympic Blvd., Los Angeles 23, Calif., ANgelus 3-6761 • SANDVIK CANADIAN LTD., P.O. Drawer 430, Station O, Montreal 9, P.Q. • SANDSTEEL SPRING DIVISION • Fair Lawn, N. J. • Industrial Springs • SANDVIK SAW & TOOL DIVISION • Fair Lawn, N. J. • Saws and Tools
Works: Sandviken, Sweden • Hellefors, Sweden

Sandvik Quality Steels

SS-95


"Big reduction in number of rejects"
"Real savings in maintenance and production costs"
"Cuts downtime by two-thirds"
"Degreaser cleanouts are easier"
"Cuts costs... eliminates solvent-control worries"
"Cuts degreasing time in half"

# Here's why TRICLENE D is used for fast, thorough vapor degreasing

These statements represent the kind of degreasing results you can expect from "Triclene" D trichlorethylene. Manufacturers of products as different as automotive accessories, sporting goods, refrigerators, locks and builders' hardware—all users of "Triclene" D—made these comments.

They use it to clean grease and oil from all types of metals with every degree of surface polish. Users note that time between cleanouts is extended, and cleanouts are far easier. "Triclene" D maintains brighter cleaning—distillation after distillation—job after job.

Heat, light, air, acids and aluminum chloride will not affect "Triclene" D with its locked-in stabilizers. "Triclene" D trichlorethylene retains its original purity longer—contains nothing to harm even the most carefully machined surfaces. Yet it costs no more than other degreasing solvents!

***Get all the facts*** on vapor degreasing. Du Pont's new book contains forty-two pages of data and illustrations on the latest metal-cleaning developments. Send for your copy—without obligation—today.

**TRICLENE® D**
TRICHLORETHYLENE

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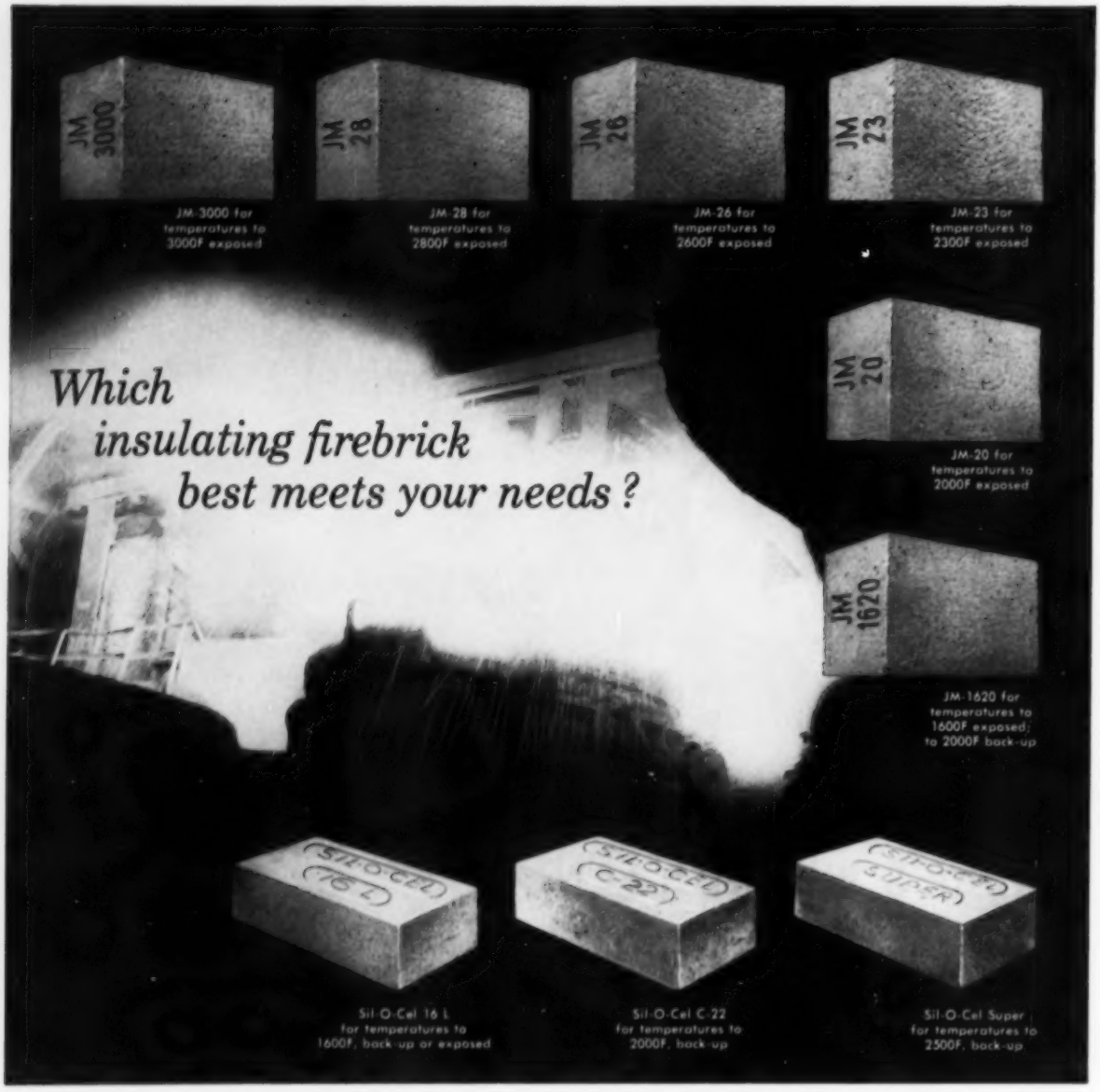
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Department S-6
Wilmington 98, Delaware

☐ Please send me a copy of your new vapor-degreasing booklet.
☐ Please have your Representative phone for an appointment.

Name_____ Title_____
Company_____
Address_____
City_____ Zone_____ State_____


JM 3000
JM-3000 for temperatures to 3000F exposed
JM 28
JM-28 for temperatures to 2800F exposed
JM 26
JM-26 for temperatures to 2600F exposed
JM 23
JM-23 for temperatures to 2300F exposed
Which insulating firebrick best meets your needs?
JM 20
JM-20 for temperatures to 2000F exposed
JM 1620
JM-1620 for temperatures to 1600F exposed; to 2000F back-up
SIL-O-CEL 16 L
SIL-O-CEL C-22
SIL-O-CEL SUPER
Sil-O-Cel 16 L for temperatures to 1600F, back-up or exposed
Sil-O-Cel C-22 for temperatures to 2000F, back-up
Sil-O-Cel Super for temperatures to 2500F, back-up

## Only Johns-Manville's insulating brick family offers the right combination of properties . . . *for furnace requirements to 3000F!*

**J-M's nine *different*** insulating firebrick* means you never have to settle for a brick that's nearly right! Instead, you choose the one brick that best meets your needs . . . for such important properties as temperature resistance, load-bearing strength, conductivity and density.

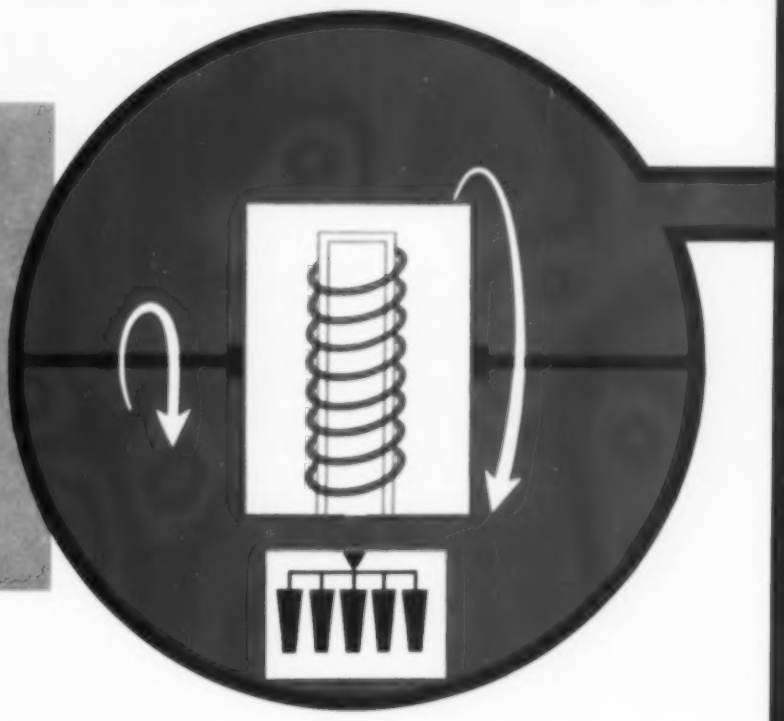
Johns-Manville has two strategically located plants for the production of insulating brick: Lompoc, California, and Zelienople, Pennsylvania. Brick are available from the stocks of authorized Johns-Manville distributors in key industrial areas.

For complete information, call your nearest J-M representative. Or write for brochure IN-115A to Johns-Manville, Box 60, New York 16, New York. In Canada, Port Credit, Ontario.

*Sil-O-Cel® Super and C-22 insulating brick are for back-up use only

**Johns-Manville** REFRACTORY AND INSULATING REFRACTORY PRODUCTS

# design with austenal in mind



*New* **VACUUM MELTING** *techniques being developed by* **MICROCAST** *give promise of higher performance parts for the future*

Austenal vacuum melting and casting techniques being currently developed may have a big place in your future designs.

Vacuum melting promises greatly improved investment castings and a wider range of cast parts, because it makes available alloys with outstanding high temperature properties. By removing harmful gases and holding down objectionable oxide inclusions, vacuum melting results in parts that are more ductile, stronger and tougher than before. Vacuum melting makes possible the use of alloys that were formerly uncastable.

For instance, these new Austenal techniques are already being studied for aircraft manufacturers on a development basis. Vacuum melting has helped furnish extremely high quality vanes and blades for future jet engines.

Discuss this new Austenal development with your Austenal representative. Vacuum melting may be the way for you to obtain higher performance in designing parts for tough jobs of the future.

*---It's* **NEW** *from Austenal*

Vacuum casting of turbine buckets such as this has been accomplished and the application of this method is being planned for other jet engine components.

**austenal**

LABORATORIES, INC.

**microcast division**

224 EAST 39th STREET, NEW YORK 16, N. Y.

7001 SOUTH CHICAGO AVE., CHICAGO 37, ILL.

# You Get MORE

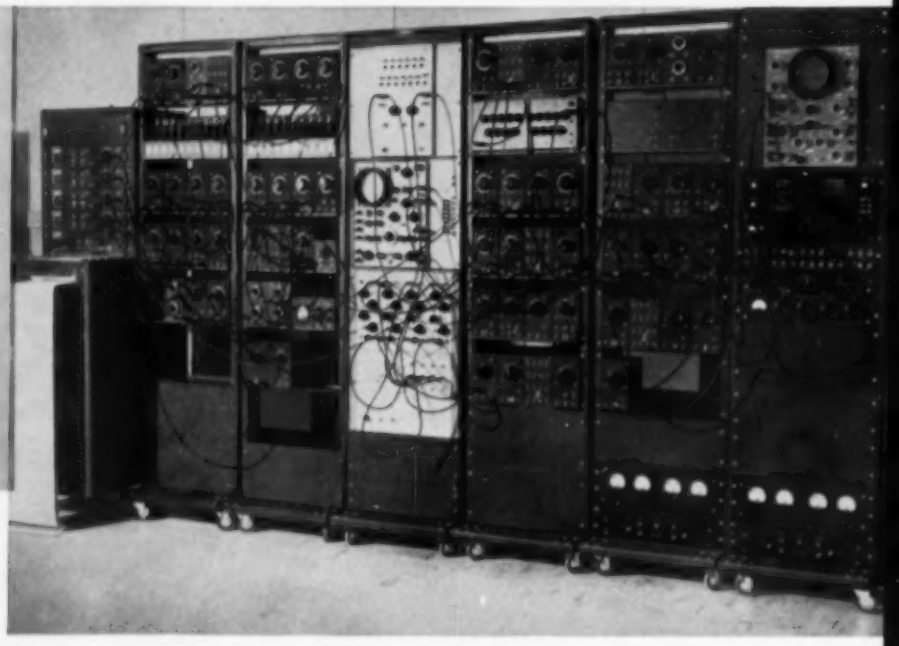
## ...because ALLIS-CHALMERS "COORDINEERS" the Entire System

EFFECTIVE regulation is more than a matter of good regulator design. It embraces overall *system* design... the integration of interdependent components — generators, exciters, motors, regulators and other control equipment. As manufacturers of a most diversified line of electrical generation, distribution and utilization equipment, Allis-Chalmers, of course, is in a unique position to provide this practical approach to mill regulation.

Allis-Chalmers maintains separate departments, staffed by research, design, manufacturing and application specialists for each product. "Coordineering" results from an interdepartment exchange of ideas and technical information correlated in *one* department specializing in metal producing industry application. In this department, components are matched to meet the requirements of your job. Responsibility for *system* performance rests with one company.

### Analytical Facilities Utilized...

System performance is simulated in the computers to get optimum configuration of components. Time constants and exciter ceilings necessary for desired response are established.



LIVE BETTER ELECTRICALLY

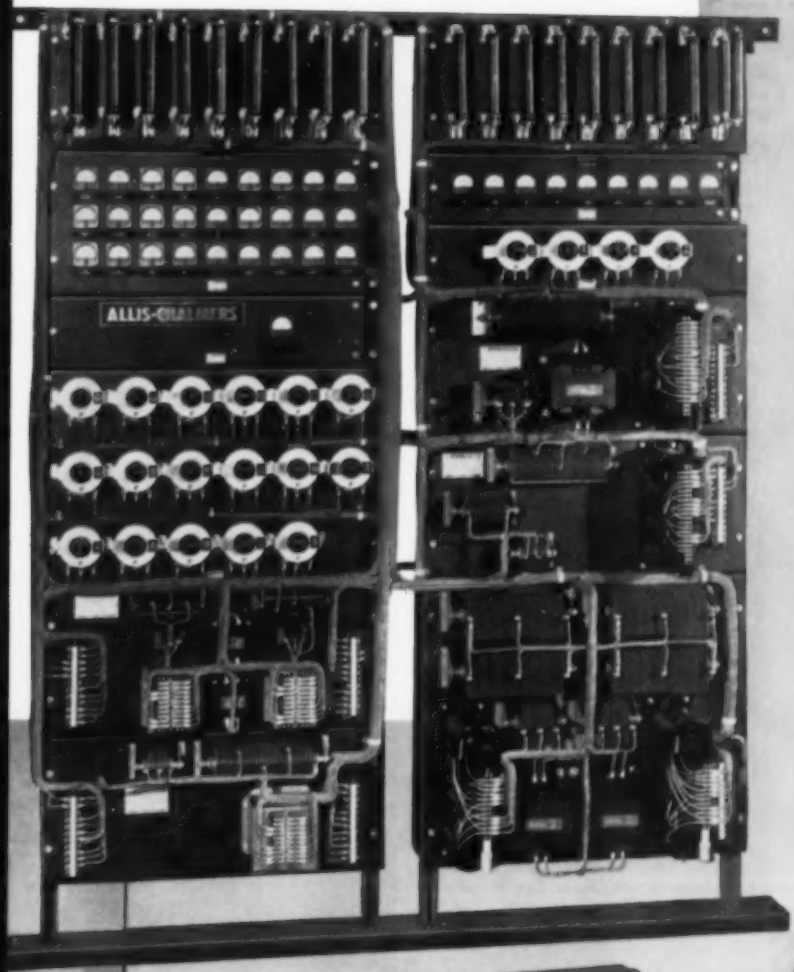
*Regulex* is an Allis-Chalmers trademark.

**ALLIS-**

STEEL

# Efficient Regulation

**ALLIS-CHALMERS**
## Regulators




**Magnetic Amplifiers**

## For MILL CONTROL

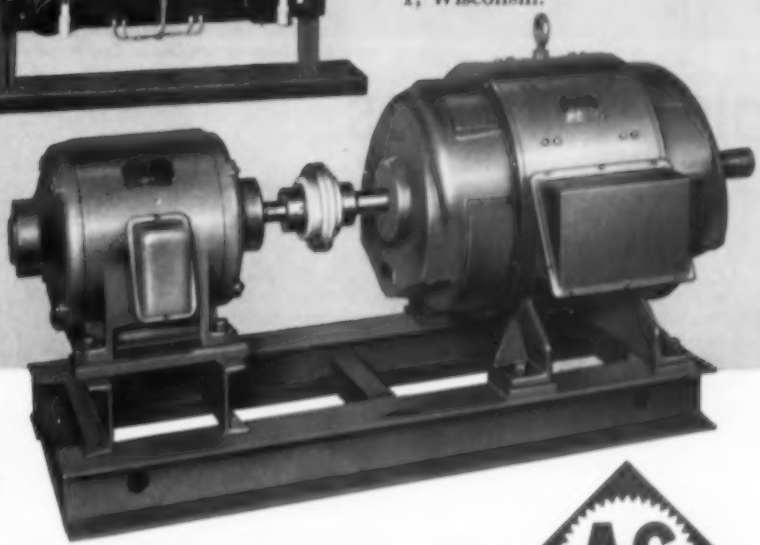
### Three Types Available

**1** ***REGULEX* Rotating Amplifier** — Applicable where high power levels for reversible output are desired.

**2** **Magnetic Amplifiers** — Applicable where low power levels for reversing or high power levels for non-reversing are desired.

**3** **Combinations of Rotating and Magnetic Amplifiers** — Each complements the other for maximum regulating efficiency.

Get all the facts. See your Allis-Chalmers representative or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.



**Regulex Rotating Amplifier**

# CHALMERS

A-C ALLIS-CHALMERS

A-5030

*Photo courtesy of Klein Supermarkets, Inc., St. Paul-Minneapolis*

# Colored stripes that roll on dry!

*Lane marking stripes* that simply roll onto the floor . . . are perfectly dry and ready for traffic the minute they're applied. "SCOTCH" Brand Plastic Tape sticks at a touch to any clean, dry surface. Stripes last up to 2 years; are unaffected by acids, greases, salts, and most commercial solvents; give an overall saving of 30%. Eight easy-to-match colors: red, green, black, orange, blue, yellow, white, brown. Ask your regular tape distributor for further information or send for folder described at right.

Always specify "SCOTCH" Brand, the quality tape . . . and stick with it!

**PLASTIC TAPE** . . . *one of more than 300 pressure-sensitive tapes for industry, trademarked . . .*

REG. U.S. PAT. OFF.

**SCOTCH BRAND**

## Look what you can do with it!

**MARK TRAFFIC** lanes, parking areas, etc. for faster, safer traffic movement. No production shut-downs are necessary when floors are marked with "SCOTCH" Brand Plastic Tape —there's no mess, no drying time.

**STORAGE AREAS** are separated from work zones with markings of "SCOTCH" Brand Plastic Tape. Eight colors let you code markings for every purpose; floor may be cleaned with usual methods.

**KEEP** fire extinguishers, emergency equipment, etc. in the clear by marking areas with patterns of "SCOTCH" Brand Plastic Tape. Vivid tape stripes can also mark obstacles, projections, danger points.

**SEND FOR FREE FOLDER** describing properties of "SCOTCH" Brand Plastic Tape and showing how you can use it in your plant. Just write on your letterhead to 3M Co., St. Paul 6, Minn., Dept. GK-66.

The term "SCOTCH" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn. Export Sales Office: 99 Park Avenue, New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

# Still in Use after 1½ Years

## of Heating and Quenching

This tray, made of a HAYNES high-temperature alloy, has been subjected to continual heating and cooling for 18 months . . . and it is still in good shape.

In the heat-treating operation, trays and rings are heated to 1550 deg. F for a half hour and then given a rapid oil quench. This repeated exposure to high temperatures and thermal shock caused other trays to twist out of shape in a few days.

The HAYNES alloy used to solve this problem was HASTELLOY alloy C. There are 10 other HAYNES high-temperature alloys—each designed to resist certain severe operating conditions. All of the alloys have remarkable strength at high temperatures, coupled with excellent oxidation resistance and dimensional stability. One of them may be the answer to a production or maintenance problem in your plant.

For information on prices, available forms, and properties of these alloys, write to our general sales office in Kokomo, Indiana or to any of the District Sales Offices listed below.

HAYNES TRADE-MARK ALLOYS

**HAYNES STELLITE COMPANY**

**A Division of Union Carbide and Carbon Corporation**

UCC

General Offices and Works, Kokomo, Indiana

Sales Offices

Chicago • Cleveland • Detroit • Houston • Los Angeles • New York • San Francisco • Tulsa

*"Haynes" and "Hastelloy" are registered trade-marks of Union Carbide and Carbon Corporation*

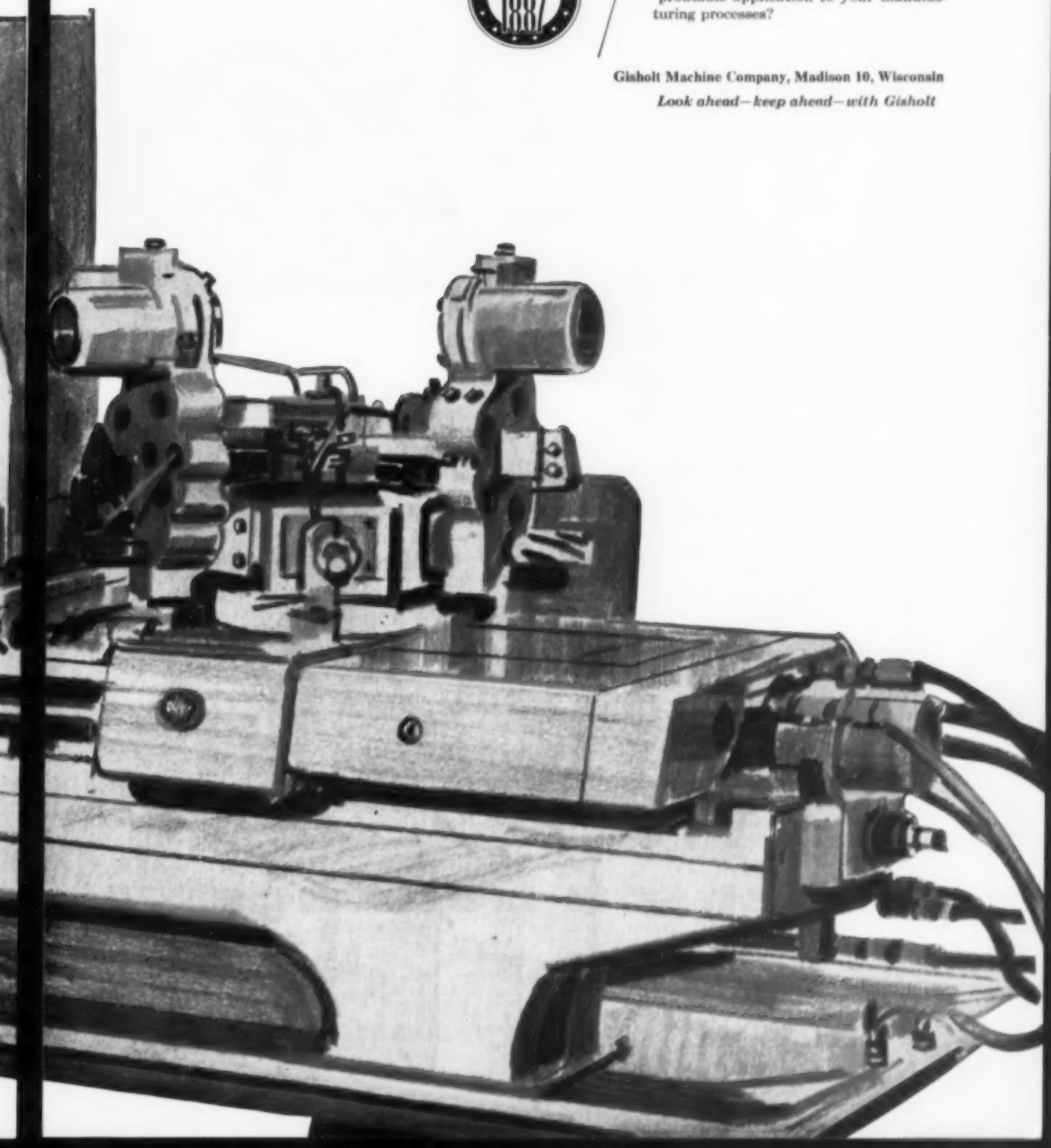
TISHOLT

# GISHOLT MASTERLINE FASTERMATIC AUTOMATIC TURRET LATHE

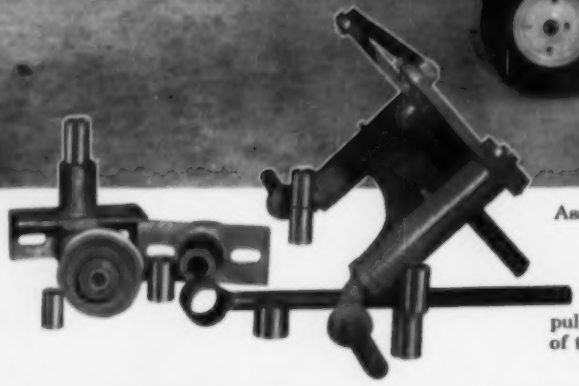
This latest design Gisholt MASTERLINE Fastermatic Automatic Turret Lathe offers many outstanding features which give you faster, easier operation, higher quality work, quicker setup and lower maintenance. In short, this machine will do your work faster and better at less cost —and with a new minimum requirement for operator skill, effort and attention. May we give you more facts about its profitable application to your manufacturing processes?

**Gisholt Machine Company, Madison 10, Wisconsin**

***Look ahead—keep ahead—with Gisholt***



Assembly line for the Beaver Riding Tractor



Johnson Bronze bearings are used in the pulley, pitman arm bracket and front axle housing of the Beaver Riding Tractor

## Hard-Working Beaver Uses Maintenance-Free Johnson Ledaloyl Self-Lubricating Bearings

When the Baird Machine Co., of Stratford, Conn., decided to produce the versatile Beaver Riding Tractor, it represented quite a change from their well-established line of heavy machinery. The skill acquired in the manufacture of durable machines weighing tons had to be turned to building a tractor weighing only 430 pounds.

New problems soon found familiar solution, however, as Johnson Ledaloyl self-lubricating bearings were called upon to provide rugged, maintenance-free service at vital points. "When we started our tractor line we didn't have to look far for what we needed," says Mr. Carl F. Johnson, Purchasing Agent for Baird. "We simply called our distributor, who already was stocking the desired sizes of Johnson Bronze Bearings. We were familiar with Johnson bearings, since we were using them in our heavy manufacturing division."

Since the Johnson distributor maintains adequate stocks of bearings, Baird never worries about inventory. A phone call replenishes the supply on any item the same day. Although Baird never had occasion to use it, they know that Johnson field engineering service is readily available in case of need.

Your Johnson distributor carries a large stock of standard precision bearings in three basic types. He will be glad to help you to improve your product while lowering the cost with standard Johnson bearings. Johnson Bronze Company, 550 S. Mill Street, New Castle, Pa.

# Johnson Bearings

GRAPHITED
over 175 sizes

GENERAL PURPOSE
over 900 sizes

UNIVERSAL BRONZE BARS
over 400 sizes

LEDALOYL
over 400 sizes

ELECTRIC MOTOR
over 350 sizes

# TWO WAYS...with Master Unibrakes

**STOP-HOLD**—Master Type M Magnetic Unibrake Motors. For quick, controlled stopping—especially when you want to hold the load. Spring-setting magnetic release brakes of the friction disc type combine with motor in a compact, integral unit. Sizes—⅛ to 150 H.P.

**ROLLING STOP**—Master Type D Dynamic Unibrake Motors. Braking is obtained with a unique, patented brake winding superimposed on the stator winding. Simple, compact, with no DC current required, the brake has no moving parts. There is nothing to wear or adjust—braking torque repeats consistently. Particularly recommended for automatic applications which do not require static holding. Sizes up to 30 H.P.



**MASTER GEARMOTORS** and variable speed drives can be supplied with integrated Unibrakes too. See Master for the perfect power drive for you.

MASTER

THE MASTER ELECTRIC COMPANY
DAYTON 1, OHIO

UNIBRAKE MOTORS

# HERE'S HOW KENNAMETAL*

# K7H

## CAN FIT INTO YOUR MACHINING OPERATIONS

Kennametal Grade K7H, developed specially for modern high velocity machining and for cutting heat-treated high tensile alloy steels, is showing outstanding results on one new application after another. Its high hardness (93.5 Rockwell A) coupled with phenomenal strength (three times that of the nonmetallics) is proving effective over a considerable range of feeds, depths of cuts and other varied machining conditions. Here are examples:

### 1. At High Machining Velocities

**K7H outperforms oxides at higher velocities:** Cutting 4150 steel, K7H outperformed three different oxides, operating up to 1200 sfm. None of the three oxides stood up at that velocity—one broke down early, a second was satisfactory to only 750 sfm, and the third up to 1000 sfm. Grade K7H performed successfully up to 1200 sfm. It also produced freer cutting action, better finish, and showed no noticeable edge wear—even after one mile of cutting.

**K7H outperforms other carbides at 1500 sfm:** Run at 1500 sfm, cutting irregular flame-cut SAE 1045 steel of 210 Brinnell, Kennametal Grade K7H outperformed previous carbide, which was run at only 255 sfm. Feed increased to .021″ for K7H from .011″ for previous grade, at same ¼″ depth of cut.

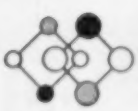
### 2. On Heat-Treated and High Tensile Steels

**K7H outperforms carbides on SAE 4340:** One Kennametal K7H insert with six cutting edges on a Kendex holder completed finish turning and facing five 30″ O.D., 4″ thick plates of heat-treated SAE 4340 of Rockwell C 45–48 hardness, at average surface speed of 600 sfm. A competing premium grade required 3 to 4 cutting edges per plate running at only 400 to 450 sfm. In other words, one K7H edge did the work of three edges of the other carbide. Conditions: Depth of cut 3/32″ to 3/16″, feed .006″ to .008″, with 63 micro-inch finish required.

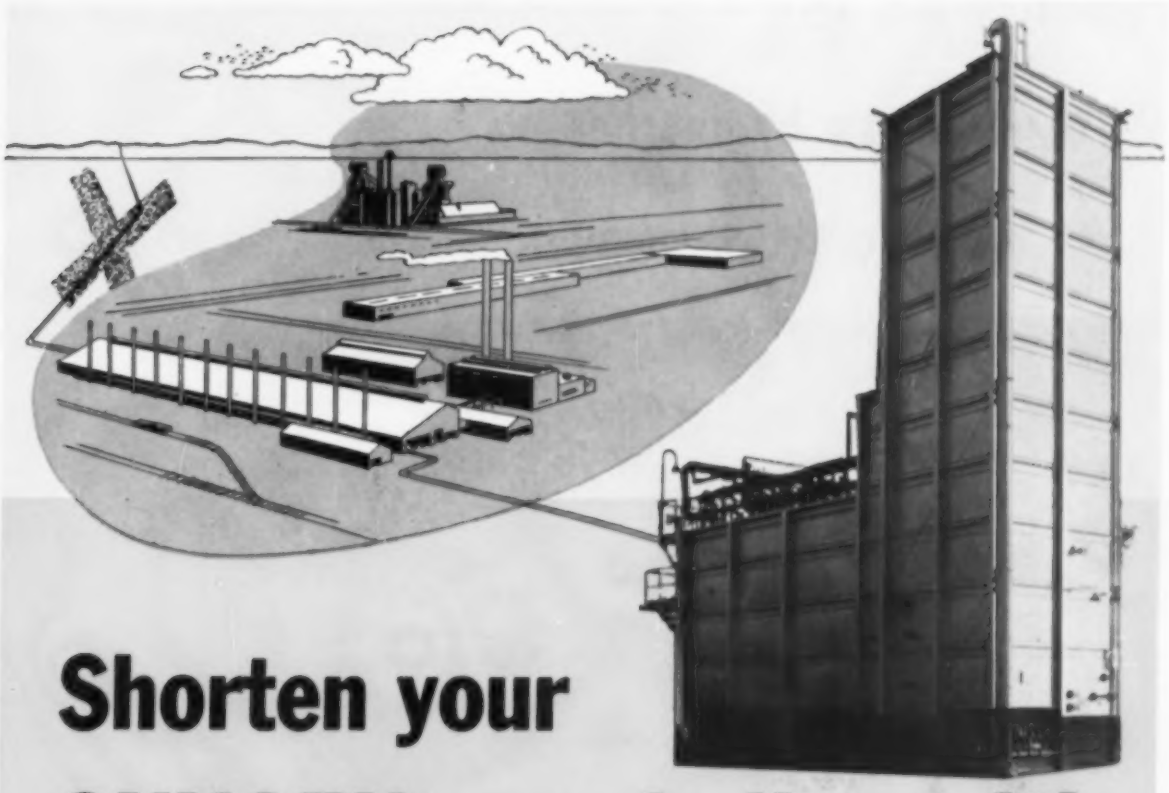
**K7H more than doubles number of pieces per cutting edge:** With K7H run at 750 sfm, it produced 18 pieces per edge as compared with 8 pieces per edge with a competing carbide run at 245 sfm. Other conditions were identical: Depth of cut ¼″, feed .011″, SAE 4140, 28 Rockwell C.

Why not have a Kennametal tool engineer help you take full advantage of this remarkably strong, hard Kennametal grade. Call him or write KENNAMETAL INC., Latrobe, Pennsylvania.

*Registered Trademark



INDUSTRY AND
KENNAMETAL
...Partners in Progress



# Shorten your OXYGEN supply line with *Air Products* "ON-LOCATION" GENERATORS

The shortest distance between the source of a material and its application is usually the most economical. Increasing use of oxygen in steel-making, for instance, strongly favors "on location" generators in contrast to all off-premises sources. "On-location" means *on the job* continuously, completely under your own control, and at lowest cost.

We will provide and install an "on-location" oxygen and/or nitrogen generating station to suit your present and expanding oxygen requirements. This can be done on a lease basis, *without capital investment by you*. Operation and maintenance can be handled by you or by Air Products—at your option—with price guaranteed at all levels of consumption.

We design and manufacture generators for unlimited quantities of oxygen and nitrogen regardless of size, purity or cycle.

Give us information regarding your present and contemplated uses of oxygen and nitrogen. We will then give you a close estimate of the savings you can make with Air Products Oxygen and/or Nitrogen Generators installed at your plant.

**More than 700 successful installations.**

**LOW COST OXYGEN...NITROGEN**

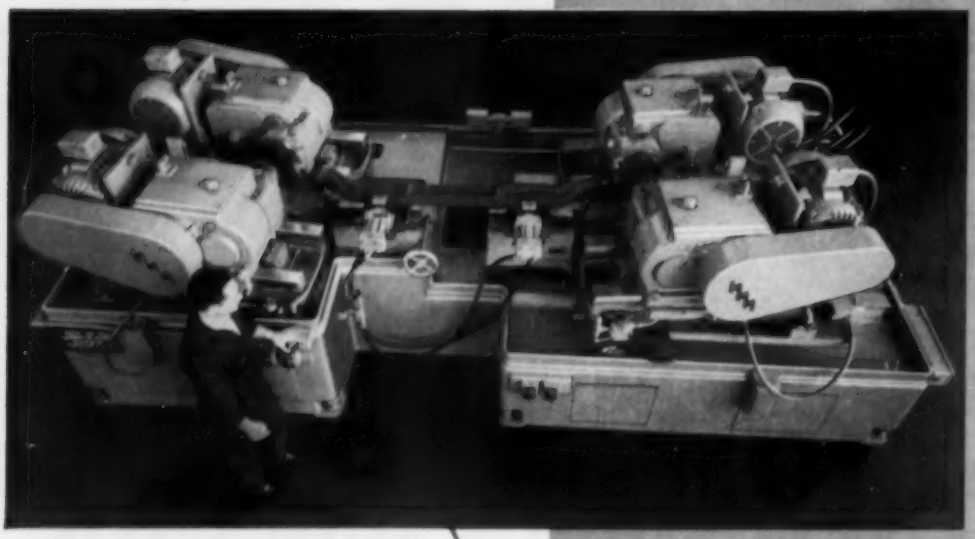
*Air Products*
INCORPORATED

**Dept. N, Box 538, Allentown, Pa.**

# MIGHTY BIG JOB

# MINIMIZED by another

# MOTCH & MERRYWEATHER *Production Solution*

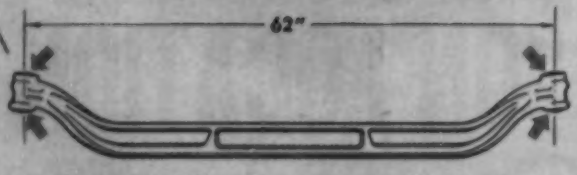


*Traveling head universal double duplex milling machine.*

Four faces of a part are milled simultaneously by this universal-special machine. Mill faster, more accurately, at less cost with a head for each surface. Motch & Merryweather engineers can design universatility into special equipment. Thus, machines performing a specific task can be quickly adapted to a variety of sizes. Have M. & M. study your next job with a view to broadening the usefulness of ostensibly special equipment.

*Write for Bulletin S-56 describing M. & M. Duplex Milling Machinery.*

**YOU'RE AHEAD WITH A HEAD FOR EACH SURFACE**




*Operation:* Milling kingpin bosses of truck axle.
*Material:* . . . . . Forged steel.
*Brinnel Hardness:* . . . . . 217-255.
*Machine cycle time:* . . . . . 30 seconds

## THE MOTCH & MERRYWEATHER MACHINERY CO.

MACHINERY MANUFACTURING DIVISION

CLEVELAND 13, OHIO

*Builders of Automatic Precision Cut-off, Milling and Special Machinery*

# World's Largest Power Shovel

As tall as a 16-story building, it carries a 60-cu.-yd. bucket. It can handle 90 tons of overburden at one bite, pile it 290 feet away to a height of 100 ft., and swing back for another load . . . all in 45 seconds.

Able to remove earth and rock overburden averaging 90 ft. in depth, this gigantic shovel known as THE MOUNTAINEER, opens up a reserve of millions of tons of coal not removable with smaller machines.

Built by Marion Power Shovel Company for Hanna Coal Company Division of Pittsburgh Consolidated Coal Company, it weighs 5,500,000 lbs., can handle 13 million pounds of material an hour. It cost $2,600,000.

USS Special Steels help to keep it working around-the-clock, all year 'round.

USS

# USS Special Steels help to working around-the-clock,

TO pay off on the more than two-and-a-half million dollars invested in it, THE MOUNTAINEER must operate continuously—24 hours a day, 7 days a week, every month in the year. It costs approximately $1,000 per hour for any shutdown.

That's why the engineers of the Marion Power Shovel Co. were so careful in the selection of the steels used in vital parts of this monster machine. So far as was humanly possible they had to build to eliminate any chance of structural failure. As a result, they turned to extensive use of USS Special Steels—steels that had proved their ability to withstand the rigors of uninterrupted operation in previous Marion shovels of very large size.

## USS "T-1" Steel adds strength and durability in dipper, dipper stick, bail, and crowd rack

Tremendous stresses are concentrated in these vital parts of THE MOUNTAINEER. Not only must they handle the largest loads ever imposed on a shovel, but they also must be able to withstand the destructive, incessant stress of high-speed, continuous operation. USS "T-1" Steel was selected to assure the longest possible service without breakdown.

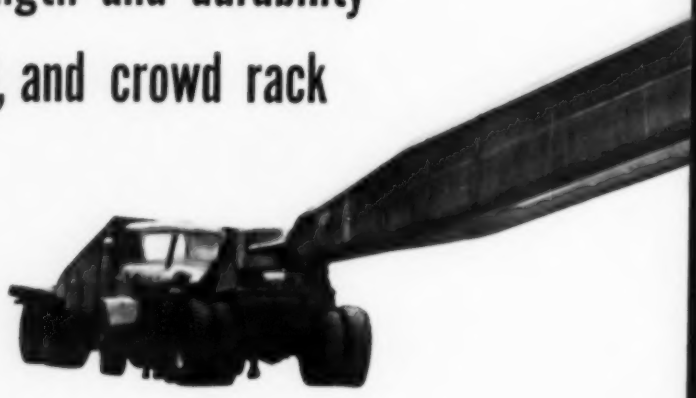
Marion Power Shovel engineers know from their own past experience how good "T-1" Steel is. They have been using it ever since 1951 when USS "T-1" Steel was developed, with their and Hanna's cooperation, for use in a 46-cu.-yd. shovel. That 46-cu.-yd. shovel was then the world's largest.

Since then, Marion has considerably increased the maximum size of power shovels to meet new requirements. In each new and larger dipper, as in the rugged, new MOUNTAINEER, USS "T-1" Steel has enabled them to boost capacity without an increase in weight.

Marion engineers have used "T-1" Steel for its great yield strength of 90,000 psi. They have used it for its extraordinary toughness and resistance to impact damage at sub-zero temperatures. Most important, they have used it for its excellent weldability, which enables them to reduce fabricating costs.

USS "T-1" Steel has performed so well for them, that they expect to use it again in new, even larger dippers which they will build soon.

USS "T-1" Steel's unique combination of properties is finding wide application not only in mining and construction equipment, but also in bridges, TV towers, and other heavy-duty products. You can probably use it to advantage. Call or write United States Steel for complete information.



**In this massive 60-yard bucket,** USS "T-1" Steel saved approximately 40 tons of dead weight, compared to the weight of conventional cast buckets of the same capacity. USS "T-1" Steel also makes repairs less costly, because it can be welded in the field.

# Used in boom and crowd handle,

# USS TRI-TEN "E" Steel ensures continuous operation

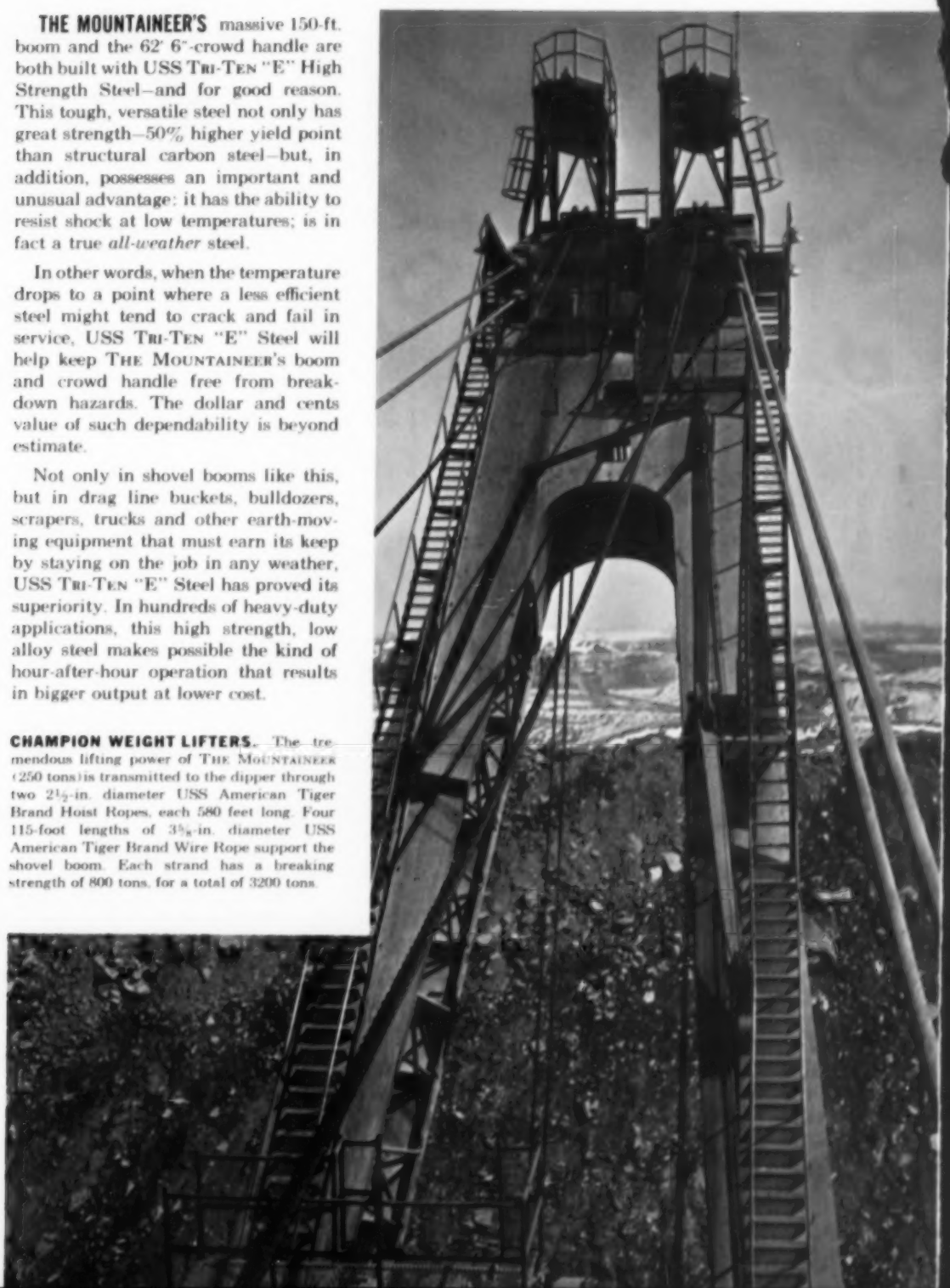
# . . . in any climate

**THE MOUNTAINEER'S** massive 150-ft. boom and the 62' 6"-crowd handle are both built with USS Tri-Ten "E" High Strength Steel—and for good reason. This tough, versatile steel not only has great strength—50% higher yield point than structural carbon steel—but, in addition, possesses an important and unusual advantage: it has the ability to resist shock at low temperatures; is in fact a true *all-weather* steel.

In other words, when the temperature drops to a point where a less efficient steel might tend to crack and fail in service, USS Tri-Ten "E" Steel will help keep The Mountaineer's boom and crowd handle free from break-down hazards. The dollar and cents value of such dependability is beyond estimate.

Not only in shovel booms like this, but in drag line buckets, bulldozers, scrapers, trucks and other earth-moving equipment that must earn its keep by staying on the job in any weather, USS Tri-Ten "E" Steel has proved its superiority. In hundreds of heavy-duty applications, this high strength, low alloy steel makes possible the kind of hour-after-hour operation that results in bigger output at lower cost.

**CHAMPION WEIGHT LIFTERS.** The tremendous lifting power of The Mountaineer (250 tons) is transmitted to the dipper through two 2½-in. diameter USS American Tiger Brand Hoist Ropes, each 580 feet long. Four 115-foot lengths of 3⅝-in. diameter USS American Tiger Brand Wire Rope support the shovel boom. Each strand has a breaking strength of 800 tons, for a total of 3200 tons.



# keep THE MOUNTAINEER day after day, all year 'round

**The 42-foot crowd rack** is fabricated from seven lengths of 6½"-thick USS "T-1" Steel. Gear teeth were machined in it to a depth of three inches—almost half the total thickness of the steel. Under this condition, the "T-1" Steel had to be of extremely high quality—sound, strong, and tough—to withstand constant severe impact loads. The machined rack sections were then quenched and tempered. Marion had no difficulty flattening, finish-machining, or welding this very high strength alloy steel.

# USS Quality Forging jack cylinders were forged from weldable alloy steel

As you can see from the picture, the shovel rests on four track assemblies. When it proceeds into a wall of overburden or coal, the shovel is *automatically* maintained on an even keel by means of a level-sensitive device that transmits signals to hydraulic equipment that controls each of the four jack cylinders.

To assure absolute reliability, a USS Quality Forging was used for each cylinder. An ingot of alloy steel was pierced; then the resultant cylinder was hot-worked over a mandrel to develop a dense, tough cylinder wall with maximum strength.

To top it off, a weldable alloy steel was used for the jack cylinder forgings. This eliminated stress-sensitive lugs or brackets, and permitted Marion to weld the cylinders into the superstructure of the shovel.

USS Quality Forgings are widely used for heavy machinery parts, rolls, sleeves and shafts. They can be made from carbon, alloy or stainless steels. *Complete* heat treating and test facilities are available. Write for our free, 32-page Forgings booklet.

USS

UNITED STATES STEEL

# For STEEL and STEEL PRODUCTS that meet today's needs and anticipate tomorrow's

## UNITED STATES STEEL CORPORATION

**General Offices: 525 William Penn Place, Pittsburgh 30, Pa.**—Manufacturers of ingots, blooms, billets and slabs; bars; plate; sheet and strip; tin plate; sketch plates and structural shapes; CB sections; bearing piles and steel sheet piling; floor plate; wheels, rails and track materials; special trackwork and accessories; mine and industrial cars; commercial forgings for heavy machinery of all types; liner plates and grinding balls; Lorig Aligner rolls and pulleys; USS Stainless and Heat Resisting Steels; USS Carilloy Alloy Steels; USS "T-1" Constructional Alloy Steel; USS High Strength Steels.

## AMERICAN STEEL & WIRE DIVISION

**General Offices: Rockefeller Building, Cleveland 13, Ohio**—Manufacturers of Wire and Wire Products—wire fencing, barbed wire, baling wire; steel posts; wire rope; aircraft control cables; rail bonds and signal bonds; telephone wire and strand; electrical wires and cables; cold rolled strip; springs and spring wire; manufacturers wires; highway guards; concrete reinforcement; nails, tacks and staples. USS Stainless and Heat Resisting cold rolled strip, wire and wire products and USS High Strength Steel products.

**CYCLONE FENCE DEPARTMENT — General Offices: Waukegan, Ill.**—Manufacturers of chain link and lawn fencing; fence gates and posts; wire partition work; wire baskets; chain link and flat wire belting; wire screen cloth, wire hardware cloth.

## NATIONAL TUBE DIVISION

**General Offices: 525 William Penn Place, Pittsburgh 30, Pa.**—Manufacturers of seamless and welded wrought tubular products (in plain, carbon and in all alloy steels applicable to pipe and tubing); standard, extra strong and double extra strong pipe; boiler and superheater tubes; still tubes; condenser and heat exchanger tubes; drill pipe, casing, tubing, drive pipe, line pipe; large OD pipe; pipe piling; line poles, flag poles, masts and booms; cylinders, gas bottles, miscellaneous pressure containers; mechanical tubing, aircraft tubing, alloy tubing; miscellaneous tubular forgings. USS Stainless Steel pipe and tubes. Also plastic (polyethylene) pipe.

## TENNESSEE COAL & IRON DIVISION

**General Offices: P. O. Box 579, Fairfield, Ala.**—Manufacturers of semi-finished steel; structural shapes; sheared and universal plates; merchant bars, concrete bars; hot and cold rolled sheets; flat and formed galvanized sheets; strip; cotton ties; tin mill products; rails, axles and track materials; forgings and castings; wire, wire rods, woven fence, barbed wire, bale ties; nails and staples. Southern distributors of products of other manufacturing divisions of United States Steel.

## COLUMBIA-GENEVA STEEL DIVISION

**General Offices: Russ Building, San Francisco 6, Calif.**—Manufacturers of iron and semi-finished steel; billets, structural shapes; sheared plates; hot rolled bars, sheet and strip; cold reduced sheets; galvanized sheets; tin plate and tin mill products; wire rods; high and low carbon wire; bright and galvanized wire; wire rope and strand; barbed wire and fence; baling wire; nails and staples. Western distributors of products of other manufacturing divisions of United States Steel.

## U.S. STEEL SUPPLY DIVISION

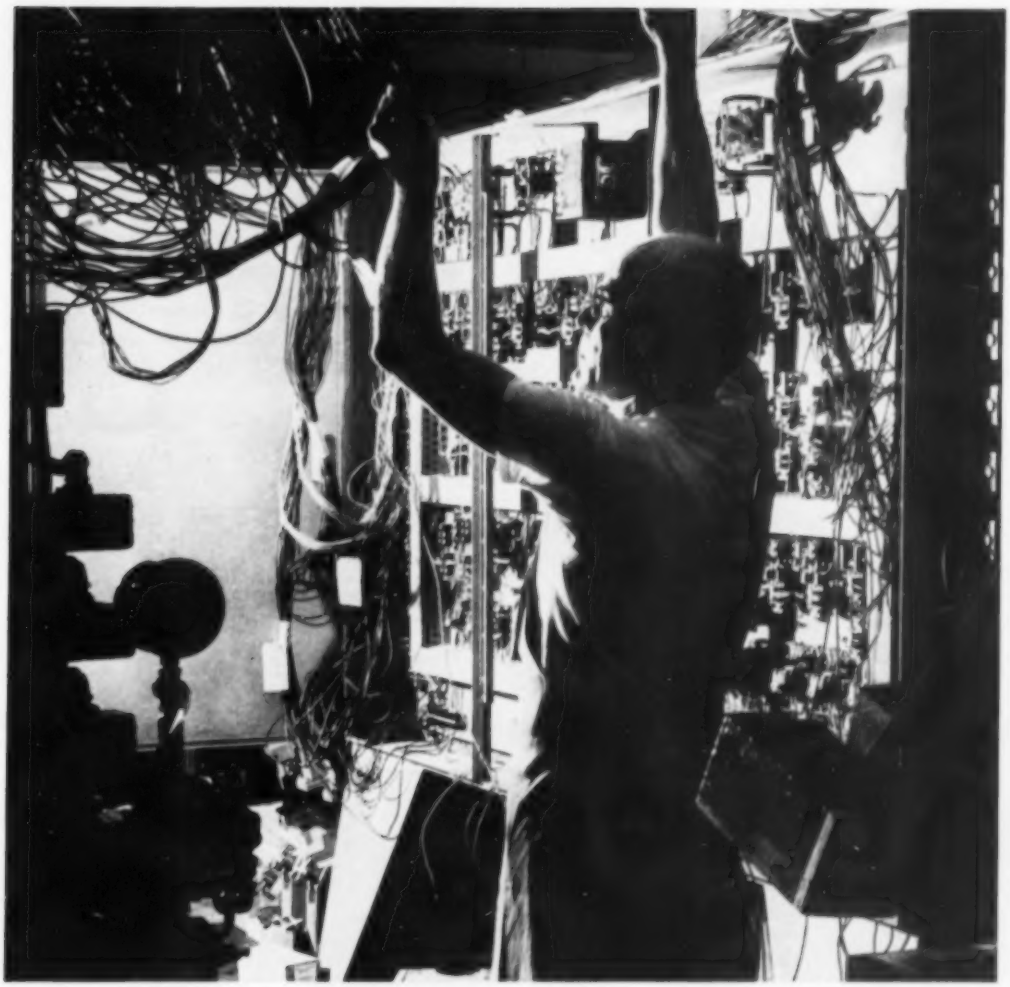
**General Offices: 208 So. La Salle Street, Chicago 4, Ill.**—Operates warehouses from coast-to-coast, carries in stock for immediate shipment hundreds of varieties and sizes of steel and steel products. Material is available in standard warehouse lengths and sizes, or can be cut to customer requirements.

## UNITED STATES STEEL EXPORT COMPANY

**General Offices: 30 Church Street, New York 8, N. Y.**—Export distributor for all steels and steel products manufactured by United States Steel.

Printed in U.S.A.

# Operation *AUTOMETROLOGY



The central nervous system goes into an automatic gaging machine which will soon allow an antifriction bearing manufacturer to make significant production savings. To be specific it will:

- Eliminate the need in the assembly area of a large inventory of bearing parts and the space that inventory occupied.
- Materially reduce the percentage of scrap.
- Greatly increase the production rate of dimensionally acceptable bearings.

This and all other automation projects are handled by Sheffield's Research Division. Sheffield has the over-all experience and the skilled technicians to make automation productive for you. Let Sheffield engineers help plan your automation project. Call the Sheffield Corporation, Dayton 1, Ohio, U.S.A., Dept. 17.

*AUTOMETROLOGY—*The single or multiple combination of machining, motion or memory with automatic measurement.*

MASTER CRAFTSMAN GOLDEN ANNIVERSARY HEADQUARTERS

SHEFFIELD

manufacture and measurement for mankind

7429

# "The right quench oil for our work is

# SHELL VOLUTA OIL 23"

says Garland Wilcox, Chief Metallurgist
Wallace Barnes Co., Bristol, Conn.

## ...the story of a profitable change

WALLACE BARNES COMPANY and steel springs have "gone together" for nearly a century. Most of today's output is in SAE 1075 or 1095 steel.

Because the quenching operation is so important to the life of springs, the Wallace Barnes laboratory decided to test its regular quenching oil against some of the newer products, including Shell Voluta Oil 23. This is what they found:

Shell Voluta Oil 23 showed a superior quench rate, with correct hardening and relative freedom from distortion. It drained more rapidly from the quenched parts, reducing dragout loss. It washed off more completely in the alkaline cleaner; it reduced flaming, and cut down on the oil baked to parts.

Wallace Barnes reports that this oil has almost eliminated trouble with "slack-quenched parts," and that heavier stock now goes through without special handling. So . . . Shell Voluta Oil 23 has replaced the former quench oil in all tanks of the spring hardening departments, serving salt pot lines and shaker hearth furnaces.

We'll be glad to provide full information on Shell Voluta Oil 23.

WALLACE BARNES CO.
A division of Associated Spring Corp.
Bristol, Conn.

Photos courtesy "STEEL"

Shaker hearth furnaces automatically dump parts into Shell Voluta Oil 23, then remove and drain them.

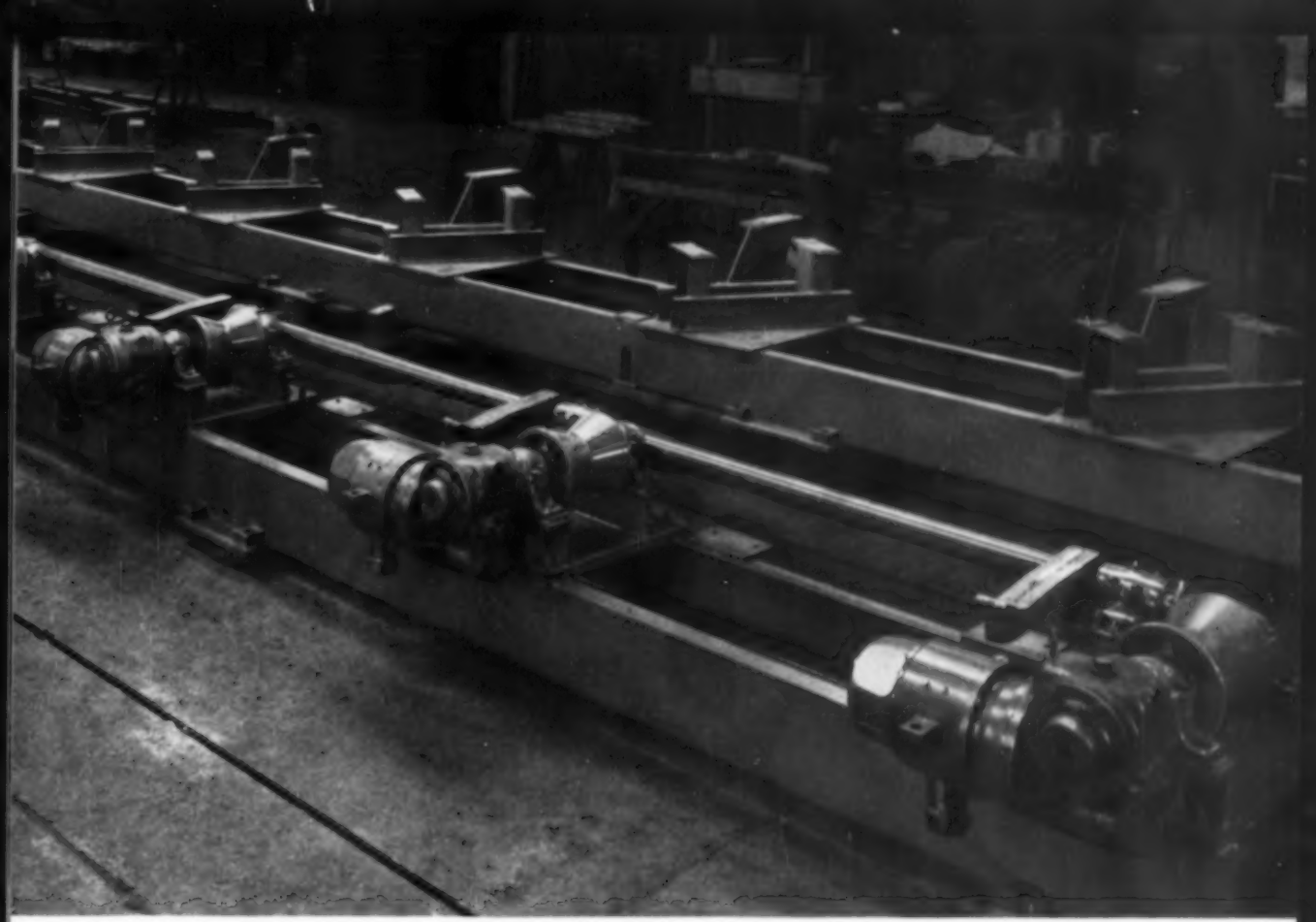
Flat springs at austenitizing temperature get a fast quench in Shell Voluta Oil 23.

Over 35,000 prints of production items like these are kept on file at Wallace Barnes Co.

**SHELL OIL COMPANY**

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL



# FACT: New floating roll-table drive solves space, shock, maintenance problems

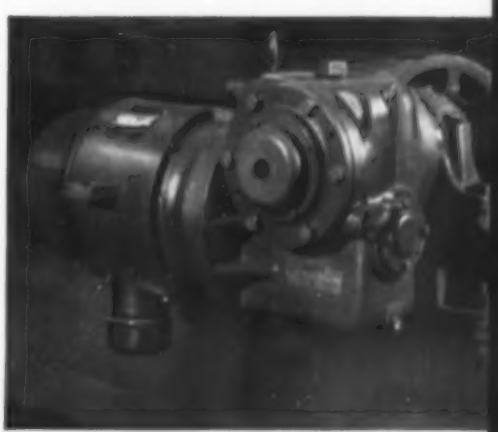
Basic facts show how Westinghouse floating gearmotors bring greater efficiency and economy to roll-type conveyor operations:

**FACT 1: Space needs minimized by compact drive design**
Shaft suspension of drive and absence of separate coupling give maximum spacesaving and assure greater operating safety.

**FACT 2: Roll shocks cushioned by spring mounting**
Spring mechanism on anchor arm and "on-shaft" mounting enable this gearmotor to withstand shocks and stresses from roll eccentricity.

**FACT 3: Maintenance reduced by drive simplicity**
Absence of couplings, simple yet rugged gear arrangement and integral design of over-all unit all combine to cut maintenance needs to the minimum.

For more facts on this or any Westinghouse gearing equipment, call *The Man With The Facts*... he's the Westinghouse sales engineer at your nearest Westinghouse sales office! J-07343



A locking screw and clamping plate lock this compact gearmotor firmly to roll-table shaft. All power is transferred to roll shaft at low unit pressures.

**WATCH WESTINGHOUSE!**

WHERE **BIG** THINGS ARE HAPPENING **TODAY!**

# Here's the NEW SIMONDS "Easy Access" (100′ COIL) METAL CUTTING BAND SAW PACKAGE

Makes it easy to remove or retract any length of blade . . . Saves your fingers . . . Protects the teeth . . . Holds 100 lineal feet.

There's no "fighting the box" or tearing your fingers with this new, easy dispensing Simonds Band Saw Package. Its special design makes it easy to pull out any desired length of blade *and retract any excess* without straining or nicking your fingers on the sharp points of the teeth.

Look for . . . ask for . . . this handy new 100′ coil package now!

Specify SIMONDS for all your Metal Band Saw needs . . .

- Standard Tooth (Regular or Wavy Set),
- Sabre Tooth (with a hook), Skip Tooth,
- Spring Temper, High Speed Steel

. . . for longest life and lowest cost on contour, cut-off or general purpose work.

**SIMONDS SAW AND STEEL CO.**
FITCHBURG, MASS.

*Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon*
*Canadian Factory in Montreal, Que., Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Heller Tool Co., Newcomerstown, Ohio*
*Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada*

**For Fast Service from Complete Stocks**

**Call your SIMONDS Industrial Supply DISTRIBUTOR**

# New---from H-VW-M

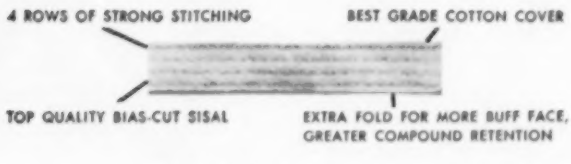
# Sisal-Flex and Tufta-Flex Contour Buffs

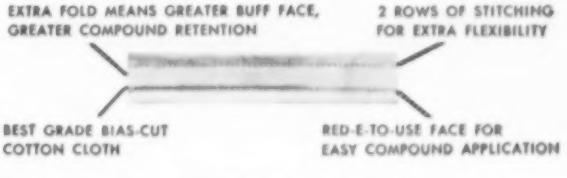
For fast, heavy-duty cutting on hard metal having contoured surfaces, choose flexible, strong, long-wearing new SISAL-FLEX Buffs! Overlapped SISAL-FLEX construction means cool running, no streaking, unusual pliancy. Check these features:

- **Best grade sisal is bias cut, then bound in top grade bias-cut cotton cloth . . . never frays, never scratches!**
- **Each buffing pad has *extra* fold . . . gives more buffing face, carries more compound on circumference and leading edges.**
- **Ventilated steel center, in 5", 7" and 9" dia. sizes. Note extra row of stitching around center.**
- ***Four rows of stitching*, for strength, longer wear.**
- **Also available with triple sewn buffing pads. Both types come in standard sizes from 12 to 18 inches in diameter.**

For fast, lighter cutting on contoured work where the final finish must be smoother, choose strong, unusually flexible, long-wearing new TUFTA-FLEX Buffs! Overlapped TUFTA-FLEX construction means no streaking, positive cutting, cool operation. Look for these special features:

- **Each buff pad made of strong 86/93 cotton—bias cut to prevent fraying, increase wear.**
- **Two rows of stitching—super flexible! Extra row of stitching around center.**
- **Double fold provides greater cutting face, extra compound-holding capacity.**
- **Ventilated steel center has rugged clamping teeth for safety.**
- **Available in standard sizes from 12 to 18 inches in diameter.**


4 ROWS OF STRONG STITCHING
BEST GRADE COTTON COVER
TOP QUALITY BIAS-CUT SISAL
EXTRA FOLD FOR MORE BUFF FACE, GREATER COMPOUND RETENTION


EXTRA FOLD MEANS GREATER BUFF FACE, GREATER COMPOUND RETENTION
2 ROWS OF STITCHING FOR EXTRA FLEXIBILITY
BEST GRADE BIAS-CUT COTTON CLOTH
RED-E-TO-USE FACE FOR EASY COMPOUND APPLICATION

Write today for more information, and prices . . . discover how new SISAL-FLEX and TUFTA-FLEX Buffs can mean *savings* in your buffing room!

*PLATEMANSHIP*

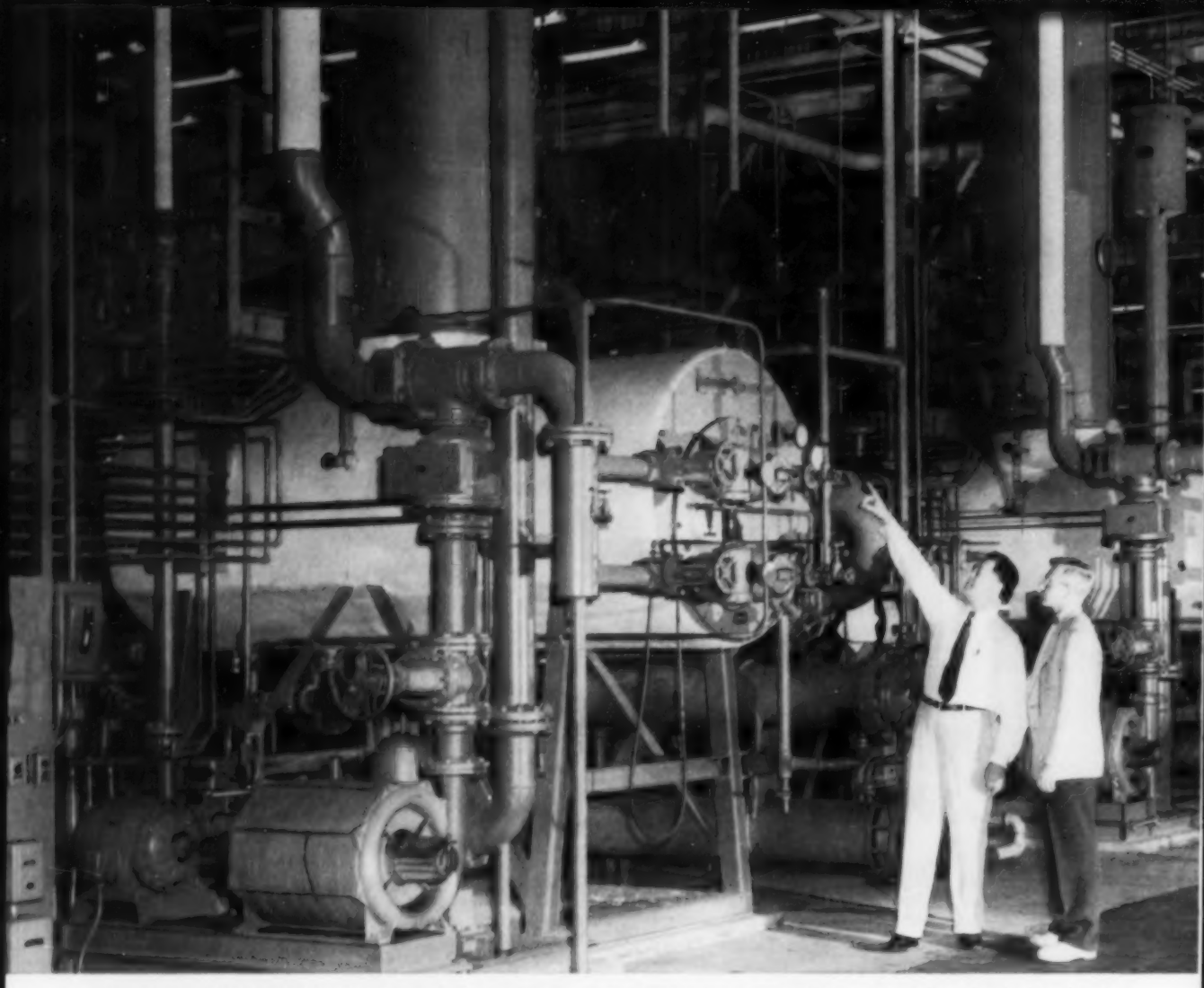
*Your H-VW-M combination — of the most modern testing and development laboratory — of over 80 years experience in every phase of plating and polishing — of a complete equipment, process and supply line for every need.*

**HANSON-VAN WINKLE-MUNNING COMPANY, MATAWAN, N. J.**
***Plants:* Matawan, N. J. • Grand Rapids, Mich.**

*SALES OFFICES:* Anderson (Ind.) • Baltimore • Beloit (Wisc.) • Boston Bridgeport • Chicago • Cleveland • Dayton • Detroit • Grand Rapids • Los Angeles • Louisville • Matawan • Milwaukee New York • Philadelphia • Pittsburgh • Plainfield • Rochester St. Louis • San Francisco • Springfield (Mass.) • Utica Wallingford (Conn.)

**H-VW-M**

**INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES**



**DIFFERENT COMPOSITIONS** of G-E Neutralene gas are possible to fit various applications—annealing, hardening, brazing, sintering, and carburizing. G-E gas producers shown are rated at 15,000 CFH; complete line includes ratings from 200 CFH.

## CAPSULE CASE HISTORIES SHOW BENEFITS OF USING PROTECTIVE ATMOSPHERES

**OXIDES REDUCED** when parts are bright annealed in Exalene gas. Pan on left is shown before cleaning; center pan, after pickling only; pan on right, after bright annealing only. Exalene gas is used also in normalizing, hardening, brazing, and sintering.

**SCALE-FREE UNPITTED** drill chuck on right was hardened in Thermalene atmosphere, does not need subsequent cleaning; chuck on left was hardened in air. Thermalene gas is used also in bright annealing, normalizing, brazing, sintering, and carburizing.

**GENERAL ELECTRIC SELLS A COMPLETE LINE OF HEAT PROCESSING EQUIPMENT**

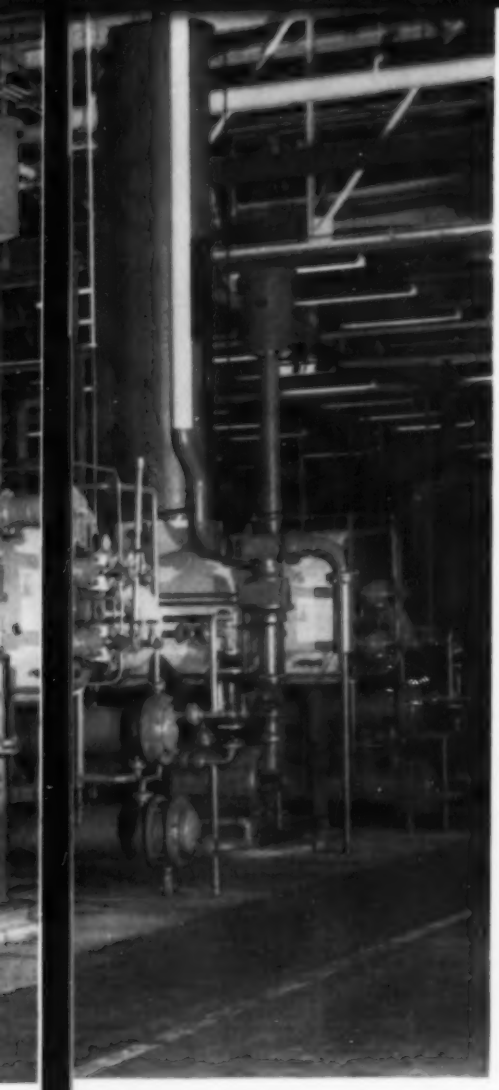
**FURNACES - METAL-SHEATH - INDUCTION**

Box

Cylindrical Pit

Roller Hearth

Elevator



# Eliminate Expensive After-work— Produce Clean Heat-treated Parts with G-E Protective Atmospheres

Protective atmospheres help you turn out heat-treated parts that are free from scale or oxides. They enable you to turn out a more salable product . . . at lower cost. This is true because pickling, grinding, machining, sandblasting, and similar operations are often made unnecessary.

General Electric offers various types and sizes of gas producers that let you manufacture atmospheres inexpensively—right in your own plant. You can prepare these atmospheres to provide exactly the right quality protection for your particular process. G-E protective atmospheres include: Exalene, an exothermic gas; Neutralene*, a $CO_2$-free, dry, exothermic gas; Thermalene*, an endothermic gas; Ammalene, dissociated ammonia.

Check these benefits of using protective atmospheres:

**PREVENTING OXIDATION** of metal surfaces during furnace heating is a primary advantage of protective atmospheres. Parts are produced at less cost and in a shorter total time cycle when scale formation is eliminated.

**REDUCING OXIDES** which have already formed is easily done by heating in a furnace supplied with the proper protective atmosphere. This reducing, or cleaning, is often used to prepare steel for porcelain enameling, galvanizing, or for furnace brazing.

**CONTROLLING SURFACE COMPOSITION** of metals in such operations as carburizing, nitriding, and prevention of decarburizing requires closely controlled furnace atmospheres.

**ACCESSORY EQUIPMENT** to meet specific needs is available:

Sulfur Removers take out sulfur dioxide and hydrogen sulfide where sulfur might harm the work or the furnace.

Regenerative-type Dryers remove moisture from gases. Can be had with closed-system reactivation for high-purity uses.

Refrigerated Gas Coolers remove some of the moisture from gases. These coolers may be used with regenerative-type dryers to reduce costs of preparing gases with low dew points.

**COMPLETE SERVICES** of your local G-E Apparatus Sales Representative include helping you to choose the most effective furnace atmosphere for your particular application . . . and to do it at lowest cost. Call him or send in coupon below for free descriptive bulletin.

*Reg. Trade-mark of General Electric Co.

**CLEANING ELIMINATED** when stainless steel parts are brazed in Ammalene gas. Right-hand part is shown as it came from the brazing furnace—bright and clean.

GENERAL ELECTRIC

**FREE BULLETIN**

Section B721-7
General Electric Company
Schenectady 5, N. Y.

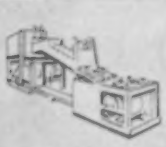
Please send me a copy of your bulletin, Protective Atmospheres, GEA-3907.

NAME _____

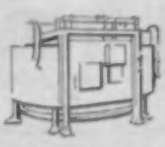
COMPANY _____

ADDRESS _____

CITY _____ STATE _____



Mesh Belt



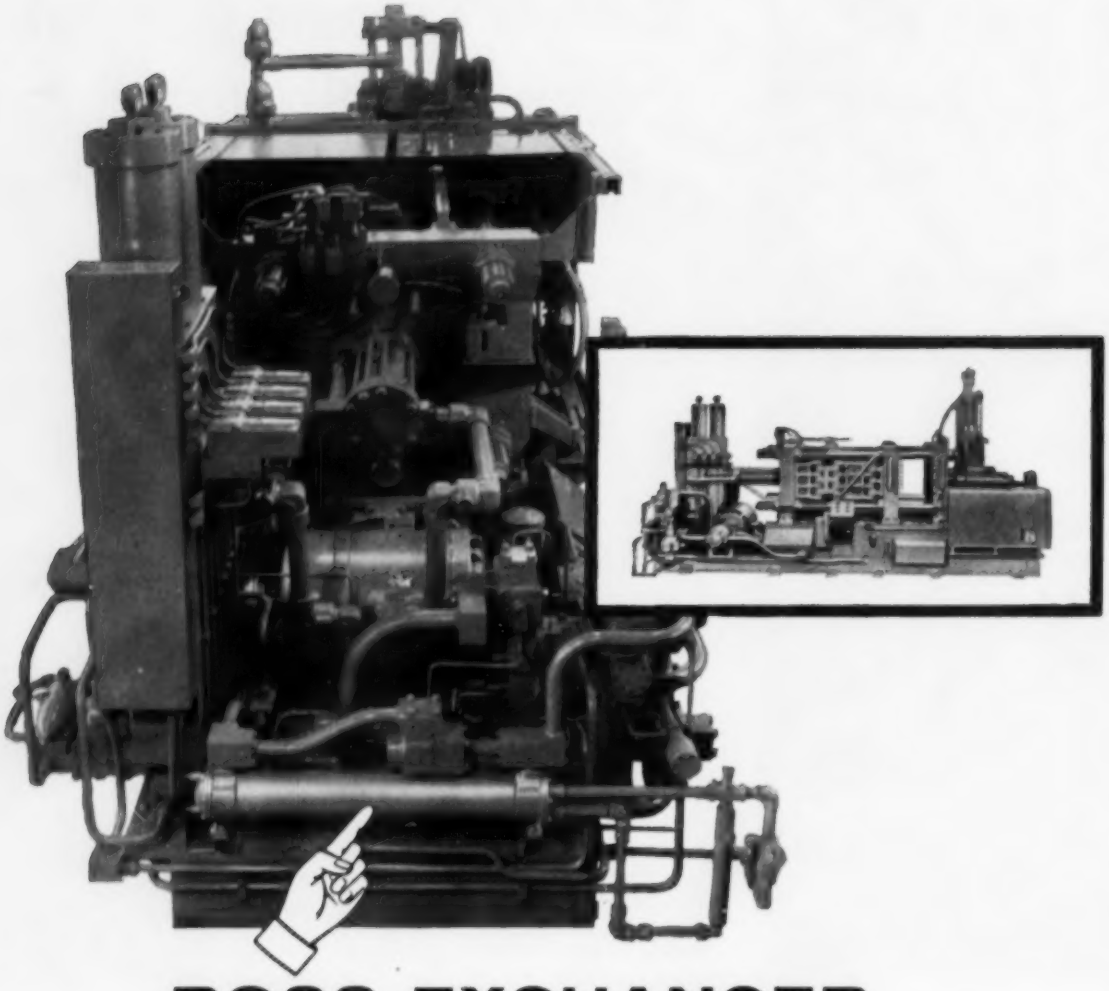
Rotary Hearth

Tower

Cylindrical Bell

Metal-sheath

Electronic Induction



# ROSS EXCHANGER

## maintains steady oil temperature

### *in this new, larger Cleveland Die Caster*

Strain gauge tested at 500-ton locking pressure, this new Model 500 Cleveland Die Casting Machine has a 25 lb. maximum shot capacity.

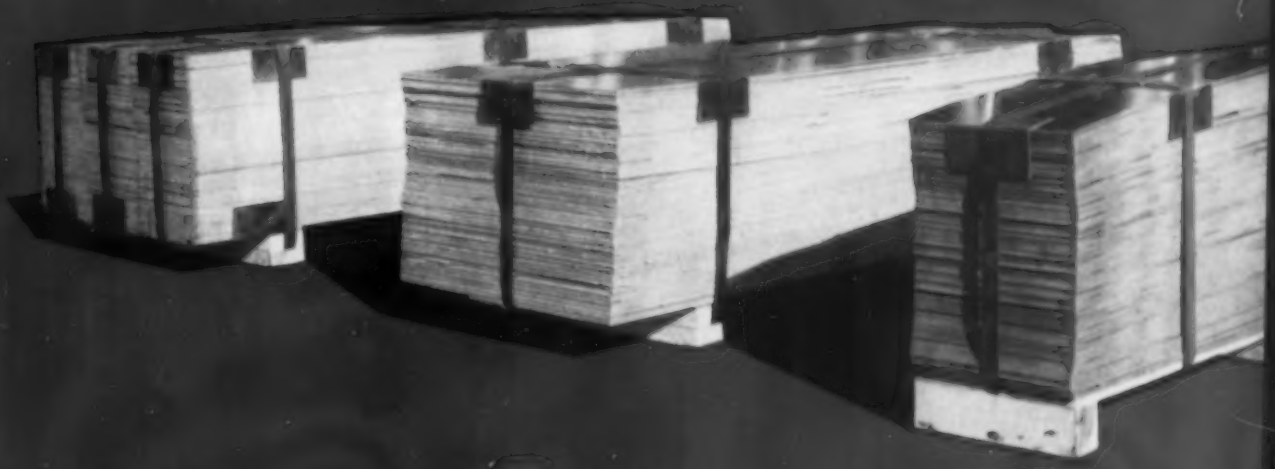
Hydraulic oil, supplied by the 200-gallon reservoir, is kept from overheating and thinning by a Ross Type BCF Exchanger. Power losses, caused by fluctuating oil temperatures, are prevented. Peak performance is assured.

Noted for their high thermal efficiency and extreme ruggedness, Ross Exchangers are specified for numerous types of hydraulic machinery: extrusion and metal drawing presses, die casting machines, powdered metal presses, injection and compression molding machines.

Pre-engineered and fully standardized, they're available in a wide range of sizes.

Bulletin 1.1K5 will give you detailed information. Write to Ross Heat Exchanger Division of American-Standard, 1431 West Avenue, Buffalo 13, N. Y. In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

ROSS | ROSS HEAT EXCHANGER PRODUCTS



# one call... Ingersoll...

## for all these special steels

PHONE
132

• carbon electric steel for tractor clutch discs • alloy steels • auto clutch plate steels • tillage steels • soft center steel • knife steels • saw steels, including high speed hack saw blade steels • Toss-Cross steel • heat-resisting steels • stainless steels • ingAclad stainless-clad steel • forging quality electric steel ingots • farm implement disc blades

# Ingersoll
STEEL DIVISION

BORG-WARNER CORPORATION, NEW CASTLE, INDIANA

B-W

*BORG-WARNER TRADE MARK

*Steel gussets, ⅜-in. thick are sigma welded to ¾-in. thick drum ends at an average speed of 15-in. per minute.*

**This welding operator doesn't have to bother with fluxes—and he doesn't lose valuable time changing burned down electrodes. In fact, by using sigma welding in this operation, the Cardwell Manufacturing Company, Wichita, Kansas has increased welding speed and almost doubled arc time. The results—a better product, faster, and at less cost.**

## AUTOMATIC WIRE FEED

Sigma welding uses a welding wire, supplied from a convenient sized coil, as a consumable electrode. In this case it is stainless steel wire which is fed automatically, and at a predetermined rate, into the welding arc. This ups welding speeds and simplifies work.

## NO FLUX

The arc is maintained in a shield of argon gas which envelopes the area between welding wire and work piece. Inert gas protection assures highest weld quality, and further simplifies welding operations.

Sigma welding is available in both manual and mechanized setups. Call or write your local LINDE representative for free illustrated literature, and find out how you can gain new production speed and unit quality with a sigma welding installation.

**Linde Air Products Company**
**A Division of Union Carbide and Carbon Corporation**
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto

*Linde*
Trade-Mark

*The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.*

# Never leave dependability out of your fuel picture

A sailboat has no choice—it must depend upon an undependable wind for locomotion. Fortunately, you have a choice in fuels for your firing system. Select the fuel known for *complete* dependability—Bituminous coal! It's the one fuel which gives you:

***Dependability of Supply***—Bituminous coal provides, for centuries to come, an inexhaustible source of low-cost heat and energy. The vast Bituminous fields served by the B&O contain a great variety of outstanding coals for every purpose.

***Dependability of Cost***—Cost is kept low and stable thanks to the advancements made by modern mechanized mining. And coal is economical and safe to store.

***Call on our Coal Technical Service!*** You will receive authoritative information on how to select the right Bituminous coal for your specific firing job . . . how to make the most of your fuel dollar. *Ask our man!*

Write: COAL TRAFFIC DEPARTMENT
BALTIMORE & OHIO RAILROAD
BALTIMORE 1, MARYLAND

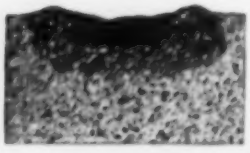
***BITUMINOUS COALS FOR EVERY PURPOSE***

**BALTIMORE & OHIO RAILROAD**
*Constantly doing things—better!*

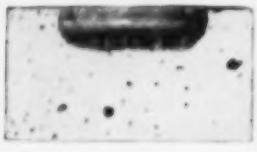
LINKING 13 GREAT STATES WITH THE NATION B&O

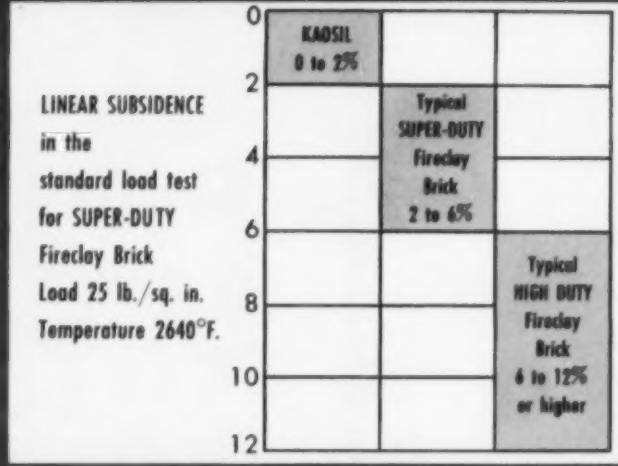
## ACTION of MOLTEN ALKALI

on high duty Fireclay Brick



and on KAOSIL




LINEAR SUBSIDENCE in the standard load test for SUPER-DUTY Fireclay Brick Load 25 lb./sq. in. Temperature 2640°F.
0
2
4
6
8
10
12
KAOSIL 0 to 2%
Typical SUPER-DUTY Fireclay Brick 2 to 6%
Typical HIGH DUTY Fireclay Brick 6 to 12% or higher

# These illustrations show why Harbison-Walker KAOSIL excels for many furnace requirements in iron and steel plants

THE remarkable resistance of KAOSIL to corrosion in atmospheres containing volatile alkalies, contributes greatly to its successful use in Blast Furnace Stoves. The photographs above show the results of five hour cup tests with sodium carbonate at 2550°F. While some erosion occurred with both brick, there was a great difference in the degree of penetration. The aluminous High Duty fireclay brick was deeply penetrated and corroded, while KAOSIL was not penetrated beyond the zone of erosion and the cup still held the glass.

Among applications for which KAOSIL is especially suited are: *Blast Furnace Stoves*—combustion walls, domes, checkers; *Soaking Pits*—sidewalls, regenerator arches, top courses of checker chamber walls, and covers; *Open Hearths*—fantail roof, regenerator roof, side walls above checkers, checker arches; *Heating Furnaces*—suspended or sprung arch roofs, walls; *Hot Metal Mixers*—above metal line; *Miscellaneous*—piers under load in soaking heats—in heavily insulated arches and walls—arches of unusually wide span.

### a SEMI-SILICA fireclay refractory of *superior* quality

1. Kaosil is made with hard-fired siliceous kaolin of exceptional purity. (Silica 75 to 76%—extremely low alkali content—less than ½%).
2. Kaosil is formed by the power-press method which provides uniform texture, free from laminations—and assures superior workmanship.
3. Kaosil remains rigid and does not become pyroplastic nor shrink in soaking heats up to its temperature limit.
4. The temperature of incipient vitrification of Kaosil is higher than that of the best aluminous high duty fireclay brick. This property contributes to its excellent spalling resistance.
5. In atmospheres containing volatile alkalies at high temperatures, Kaosil becomes glazed and penetration is thereby greatly retarded.

**HARBISON-WALKER REFRACTORIES COMPANY**
AND SUBSIDIARIES
*World's Most Complete Refractories Service*
*GENERAL OFFICES:* PITTSBURGH 22, PENNSYLVANIA

**FOR EASY FABRICATION.** At Young Machinery Company, Muncy, Pa., this man, like all good welders, has no trouble with Stainless Steel in the shop. Both electric and heliarc welding are used extensively on Stainless. Fabricating operations are different, but they're not difficult.

**FOR HARD SERVICE.** This Kooler-Grill is made by the Victor Products Corporation. It grills 200 hot dogs per hour, heats the buns and stores plenty of ice cold drinks. USS Stainless Steel is used for all the areas subjected to hard service—where other materials would chip, dent or corrode.

# NOTHING *can equal* *Stainless Steel*

*in its combination of desirable properties*

No other design material can match Stainless Steel in its combination of desirable properties: corrosion resistance, strength and hardness, beauty, cleanability and easy fabrication. When seeking a source of supply, remember that United States Steel offers you the widest range of types, finishes and sizes.

UNITED STATES STEEL CORPORATION, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO · NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

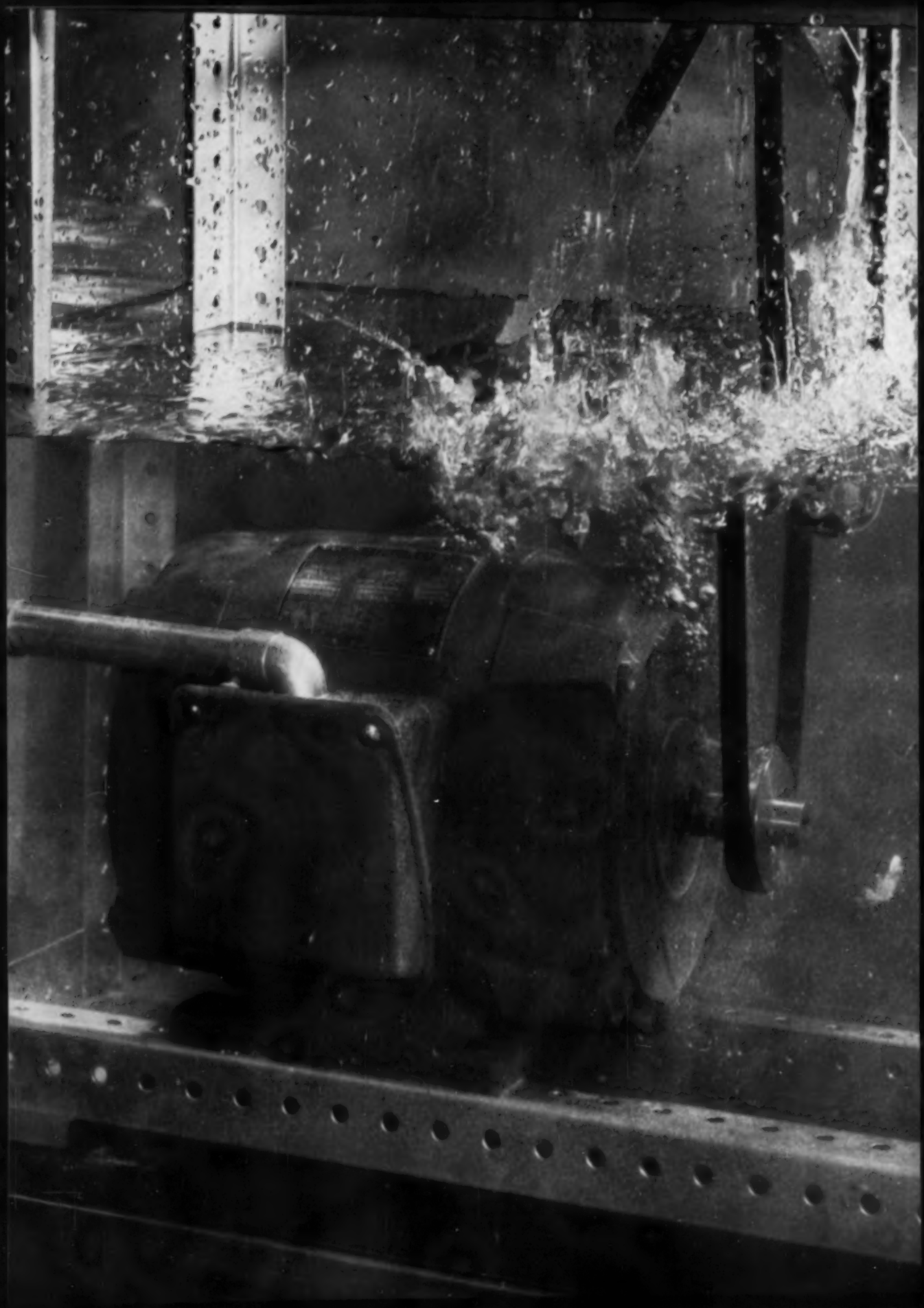
## USS STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS
PIPE · TUBES · WIRE · SPECIAL SECTIONS

USS

UNITED STATES STEEL

**FOR LONG LIFE.** In 1934, the Burlington Zephyr startled the world with an *average speed* of 77.61 mph between Denver and Chicago. That original train is still in service after rolling about 3 million miles, and the Stainless Steel exterior remains in perfect condition.



TOMORROW:

# A Standard Motor That Can Live With Water

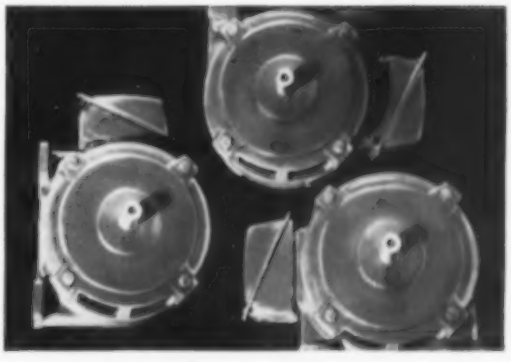
## The New Life-Line A Is Another Step Closer

Today's standard motors cannot long endure the water conditions shown here. But Westinghouse is working toward a standard motor that can "live" with water like this tomorrow.

Meanwhile improved frame design, insulation and bearing protection give the Life-Line® "A" more protection than ever before. It can withstand more water and other contamination than any other motor you can buy. It's industry's closest approach to a standard motor that can operate with or within water—in any amount.

Your Westinghouse sales engineer can show you many additional reasons why the Life-Line "A" is industry's most advanced and preferred motor. Call him today.

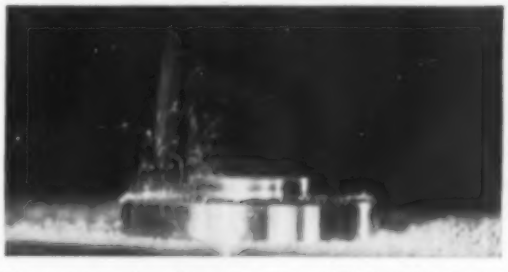
J-21924



New cast-iron frames and brackets utilize the finest grained castings with uniformly thick-walled sections precisely fitted and sealed—another reason why the Life-Line "A" is so preferred.

**WATCH WESTINGHOUSE!**

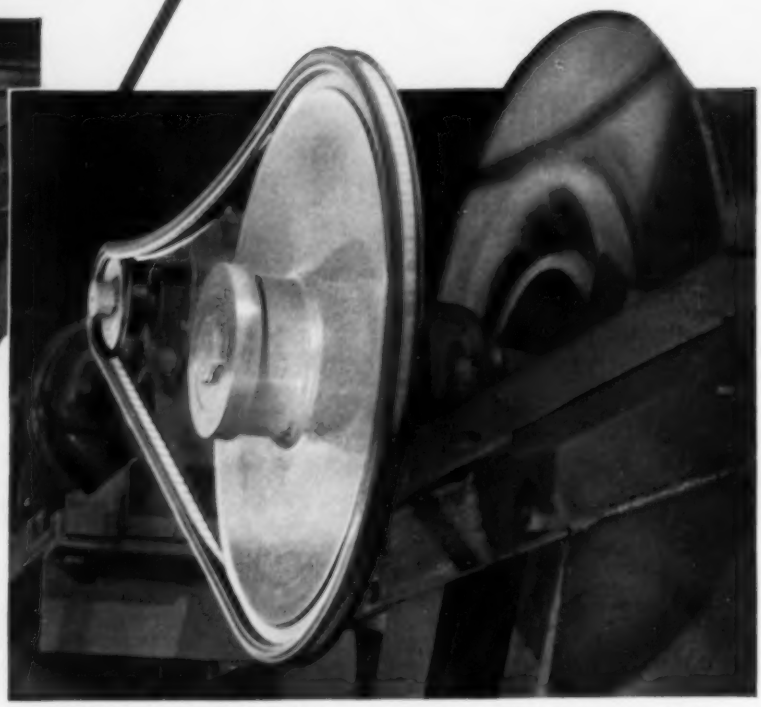
*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***



Two outer seals of new 4-way sealed bearing act as flingers and literally throw off damaging contaminations. Inner seals, attached to outer bearing race, are stationary and form a positive labyrinth.

## It's not static strength...

**RESISTANCE TO TENSILE STRESS** is achieved by use of properly heat-treated, accurately-machined side bars made of premium steel and fitted with properly-hardened pins, bushings and rollers. But to resist *operational* stresses, additional controls over dimensional accuracy, uniformity and roller resiliency are essential.



**STRENGTH OF CHAIN IN MOTION** is accomplished through tensile strength *plus* special Link-Belt refinements. These include pitch-hole preparation, micro-finish of parts, special processing of sidebars, prelubrication and rigid quality control from initial selection of materials to final protective boxing.

# it's *dynamic strength*

## in LINK-BELT Roller Chain that fights fatigue

ON high-speed drives or heavy conveying jobs, the components of every pitch of roller chain face severe and repeated operating stresses—engagement with sprockets, shock of starting loads, centrifugal loads and others. That's why *dynamic strength*—ability of chain to resist these stresses—is so important. And it's built into *every length* of Link-Belt Precision Steel Roller Chain.

How is dynamic strength developed? In addition to Link-Belt "extras" . . . special design, manufacturing and processing steps provide required properties of uniformity and accuracy for long-life operation.

Talk over your roller chain needs at your nearby Link-Belt office or authorized stock-carrying distributor. Ask for Book 2457, covering this complete line of single and multiple widths, in ¼ to 3-inch standard pitch, 1 to 3-inch double pitch.

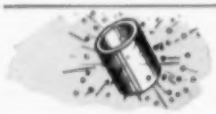
14.132

**LINK-BELT**

**ROLLER CHAINS & SPROCKETS**

**LINK-BELT gives you dynamic strength that comes from these important EXTRAS**

**PRE-STRESSING** of multiple width chain provides uniform load distribution.



**SHOT-PEENED ROLLERS** have greater fatigue life, added ability to withstand impact.

**CLOSER HEAT-TREAT CONTROL** —coupled with rigid testing insures uniformity.

**LOCK-TYPE BUSHINGS** (applied on a range of sizes) end a cause of stiff chain.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

**Pattern Design Strip**—"Thomas Strip is the only company that can supply our requirements for Pattern Design plated strip," says an official of Milwaukee's M. A. Gerett Corp., world's largest manufacturer of fine coin banks like those shown above in assembly. Thomas' lacquered copper, brass and nickel coated strip cut M. A. Gerett's rejection rate 7 percent. Piece buffing at Gerett was eliminated through adoption of Thomas' Pattern Design Strip. Die life increased, too, because the strip's coating acts as a lubricant during the forming operation. yet doesn't crack.

**Brass**—Gleaming brass coated strip from Thomas offers manufacturers electrolytically pre-coated steel with a finish that can be oxidized readily to a variety of shades. Subsequent lacquering gives an attractive and permanent final product finish. Here is steel's strength and economy with the advantages of brass. It protects parts-in-process against corrosion and lends itself readily to production of small stampings, drawn parts, tubing and roll-formed sections. Available in natural, planished and buffed finishes in a variety of widths, tempers and gages.

COLD ROLLED STRIP STEEL

P

# You Can Bank On Saving Money With Thomas Strip Pre-coated Steel

Manufacturers using Thomas Strip—pre-coated with zinc, copper, brass, nickel, tin or lacquer—are piling up big dollar savings.

These fabricators are reducing their production costs . . . stretching supplies of hard-to-get, expensive metals . . . and making their finished products more competitive and attractive.

Pre-coated steel specialties from the Thomas Strip Division of Pittsburgh Steel Company come to you already electroplated with zinc, copper, brass or nickel. Or you can get them hot dip coated with lead alloy or tin. Natural, planished or buffed finishes are available. Lacquer coatings are furnished in a full range of colors or in clear lacquer. Thomas also can supply you close tolerance plain steel strip in a variety of tempers, grades and finishes.

Thomas Strip has long been recognized for precision rolling to extremely close tolerances in gages down to .004 inch and up to 22 inches in width. Tempers include 1, 2, 3, 4 and 5, or special tempers as required. You can get Thomas Strip in oscillated or ribbon-wound coils or in cut lengths. A choice of edges is available to meet your exact specifications.

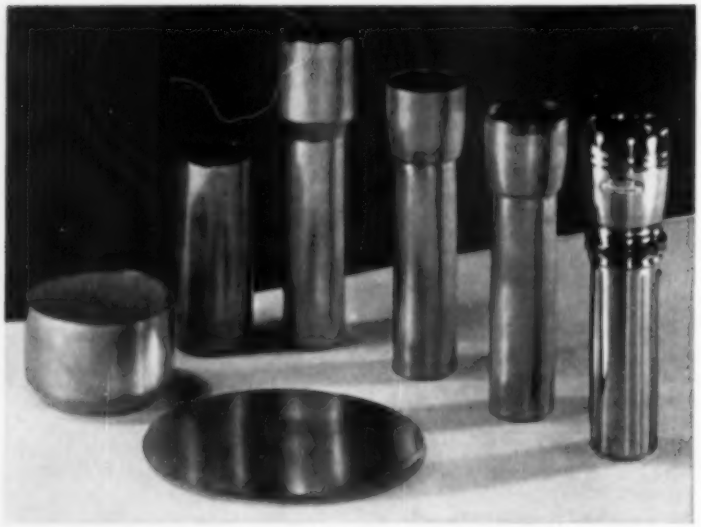
Don't overlook the possibilities of Pattern Designed rolled strip which Thomas produces in an almost unlimited variety of patterns in coated and uncoated finishes. Turn the page to see how other manufacturers are cutting costs with Thomas Strip products.

**HOW PRE-COATED THOMAS STRIP SAVES YOU MONEY**

**Nickel Coated Strip**—Loose Leaf Metals Co. of St. Louis is one of the largest manufacturers of metal hardware for binders and loose leaf books. Photograph shows production of a metal part for a first grade ring metal. President George A. Ober says: "We have never experienced a flaky surface on a Thomas product. We've come to know Thomas will not ship until its product is right, therefore, we have never had to reject their materials." Thomas is a major supplier of cold rolled nickel, copper, tin, zinc and lacquer coated steel.

**Plain Steel**—Bright uncoated steel strip in low carbon, alloy and spring steel grades, has uniformity of temper, gage and finish. Above, plain cold rolled steel passes through a temper mill at the Thomas Strip plant. In addition to high finishes, Thomas Strip is available in dull and regular finishes, in coils or cut lengths—in a choice of edges—and a range of specifications.

# Here's Why You Cut Costs With Thomas Strip



**Copper Coated Strip**—Here's the evolution of a Ray-O-Vac flashlight—from electroplated copper strip, produced by Thomas Strip, to the finished product. Blake Manufacturing Division of Ray-O-Vac Company at Clinton, Mass., changed from brass to steel for this and other flashlight cases. Production savings from 17 to 29 percent resulted. Ray-O-Vac uses a .020 gage, non-scalloping, deep drawing quality strip steel produced by special processing techniques. The steel is electro-copper coated on both sides, and is 6⅝ inches wide. On three popular models alone, the savings amounted to more than $100,000 in one year.

- **Thomas Strip Fabricates Easily**—Coatings stand fully as much fabrication as the easy-to-work base steel.
- **Die Life Is Lengthened**—Most coatings lubricate dies, reduce wear.
- **Gives Maximum Pieces Per Pound**—Because Thomas Strip is rolled to extremely close tolerances, you get the maximum number of parts per pound of metal.
- **Cuts Plating Costs**—Thomas coatings can serve as a final product finish or as a prepared base for further plating or painting.
- **Your Manufacturing Processes Are Streamlined**—Ready-to-fabricate Thomas Strip streamlines your manufacturing processes to two essentials—fabricating and assembly.
- **Extends Economy Of Steel To Many Parts**—Pre-coated Thomas Strip replaces more expensive metals.
- **You Can Begin To Save Today**—Experienced Thomas metallurgists and technicians are available now to help you with your steel problems. Their help is yours for the asking. Write or call any Pittsburgh Steel Company sales office.

**Zinc**—Long "strips" of Thomas zinc-coated steel hold the vegetable fiber in Fuller Brush Co.'s power-driven brushes shown above. In foreground is an industrial brush used to process plywood. The brush in the background is for an automobile washing machine. Although zinc-coated steel undergoes a severe deformation in forming machines, this Thomas product takes the punishment easily. The heavy, uniform coating of zinc remains undamaged, giving the brushes long life.

**Tin Coated Strip**—International Register Co. of Chicago, producer of electrical timing devices, made approximately a 20 percent saving when it switched to Thomas pre-coated strip. Tin coated strip, like that above, provides corrosion resistance to dials, gear case covers and other timer parts. Above, Ray Gabriel, International's Steel Buyer, shows Pittsburgh Steel representative Buck Mills a completed Intermatic Time-All appliance timer.

**Lacquered Strip**—"Nothing works as well on our machines as lacquered steel strip from Thomas," declares Max Haas, plant manager for Hinton Associates, Inc., of Staten Island, N. Y., manufacturer of Happiness Bird Cages. Hinton Associates processes blue or pink lacquered strip in the machine shown above to form a border for seed guards on its cages. Mr. Haas said: "We like Thomas lacquered strip because it doesn't break in forming machines or power presses. The zinc backing on the strip permits the rolls to get a good grip when the metal passes through our machines."

**High Carbon**—Thomas Strip's high carbon strip gets a tough test in the Toledo, Ohio, plant of Prestole Corp., manufacturers of steel fasteners. Prestole bends, twists, shears, punches and forms Thomas Strip's high carbon strip, as in the operation above. It has to have steel that's free of excessive burring, gives the finished fasteners the right springback and proper tension. Each coil must be uniform in chemical and physical specifications. "We've never had a complaint yet about Thomas quality," says Roy Gutzmer, plant manager.


Thomas Strip®

Division

Pittsburgh Steel Company

Grant Building · Pittsburgh 30, Pa.

District Sales Offices:

| | | | | |
|---|---|---|---|---|
| Atlanta | Columbus | Detroit | New York | Tulsa |
| Chicago | Dallas | Houston | Philadelphia | Warren, Ohio |
| Cleveland | Dayton | Los Angeles | Pittsburgh | |

Some of the thousands of varied parts formed on the Steelweld Press. These involve bends and curves of every description in many plate thicknesses. Bars of heavy cross-section, usually requiring a bulldozer, are formed into semi-circles for gear rims and similar uses.

# 800 Tons of Plate Formed Monthly

**STEELWELD PRESS**
***Produces***
**Infinite Variety of Curves and Bends**

This Steelweld Press is rated at ½"x14'-0" mild steel. With the 24-inch bed and ram extension at each end, it will bend plate that can clear by the 18-inch deep throat to 18'-6" long. Two cross shafts with foot pedals are provided for operating the press. The lower shaft is for normal operation while the upper shaft brings the reversing flywheel into action to back the ram off the work whenever desired.

EVERY month some 800 tons of plate of all thicknesses to one-half inch is formed with bends and curves of every description on a Steelweld Press. The machine is in operation nine hours a day.

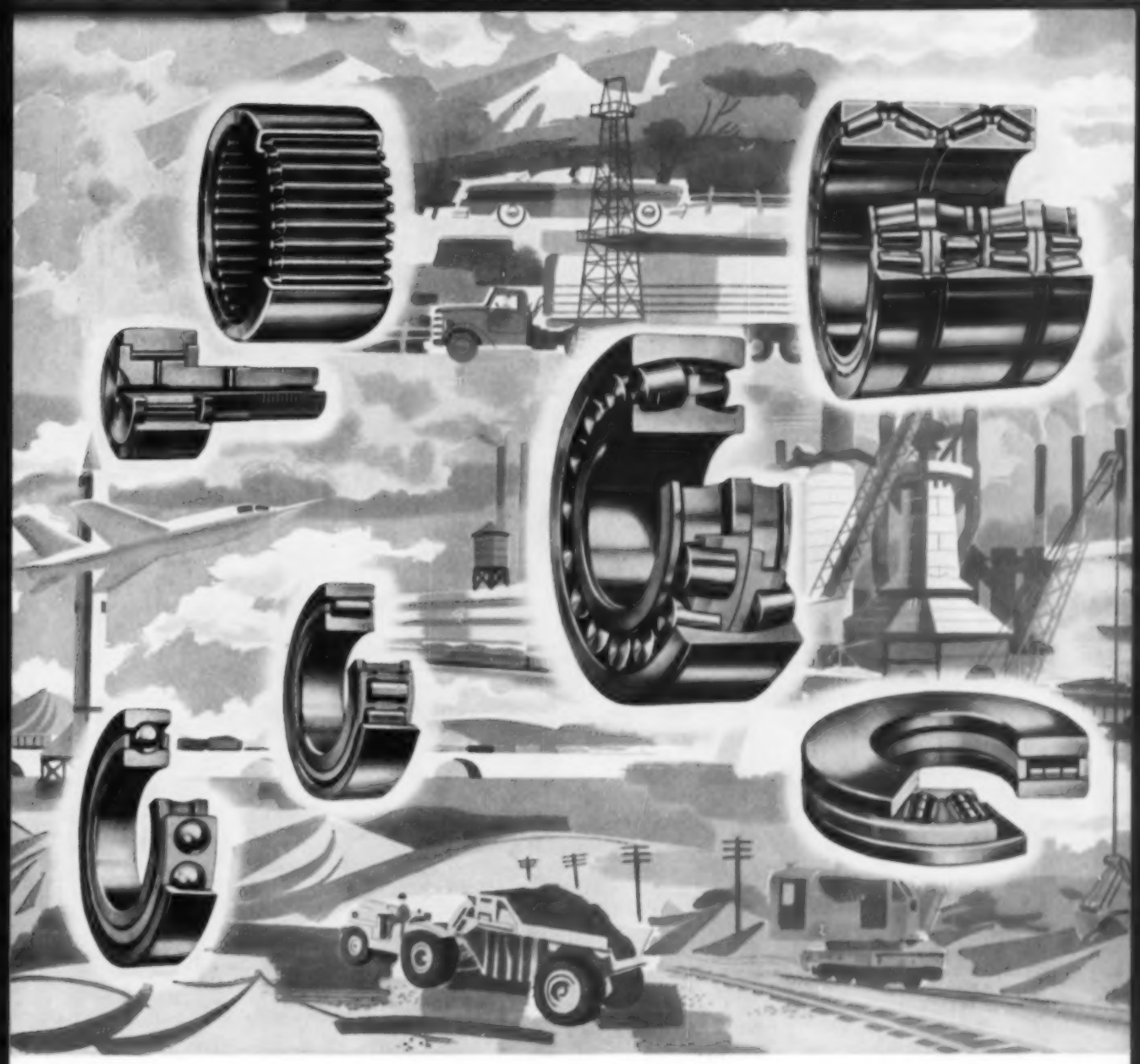
Since parts formed are produced in very small duplicate quantities, the dies and machine settings usually must be changed many times during a day. Because of the ease with which Steelweld Presses can be set up, the operators can do this quickly and easily.

Steelweld Presses offer so many advantages that we urge you to write for the catalog below and get all the facts on them. Hundreds of these machines are now in use for bending, forming and punching operations of every description.

***GET THIS BOOK!***
CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

**THE CLEVELAND CRANE & ENGINEERING CO.**
7851 East 281st Street, Wickliffe, Ohio

# STEELWELD
## *BENDING PRESSES*
BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING



# WHEN YOU NEED A BEARING—*remember this:*

## **TORRINGTON** *makes every basic type of anti-friction bearing*

**When there isn't a bearing big enough or small enough to do the job you want...**

TORRINGTON will build it for you to the size and tolerances you need.

**When you have a special problem...**

A TORRINGTON ENGINEER will consult with you and recommend a bearing that's best for the job. You can rely on his judgment because bearings are his business and he has the backing of engineering staffs at Torrington, Conn., and South Bend, Ind.

We're proud we can offer our customers a service of such breadth and depth.

THE TORRINGTON COMPANY

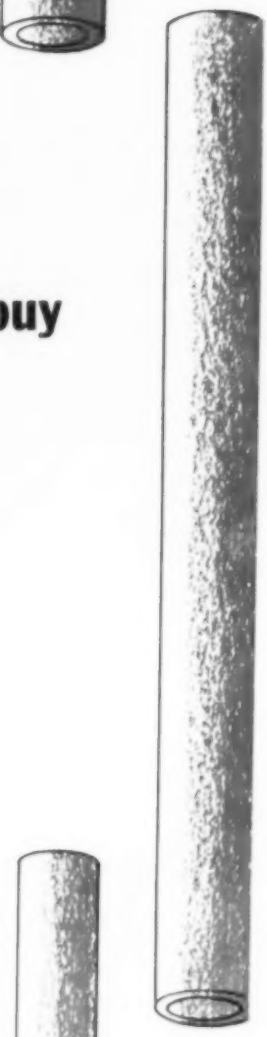
South Bend 21, Ind. • Torrington, Conn.

*District offices and distributors in principal cities of United States and Canada*

## TORRINGTON BEARINGS

Spherical Roller • Tapered Roller • Cylindrical Roller • Needle • Ball • Needle Rollers

# See how much YOU will save when you buy ASARCON BEARING BRONZE in the exact length you need



If you're buying standard 13-inch bronze bars, you have a remnant problem; and that's expensive!

Prove it to yourself. Take your pencil and fill in the blanks below:

**TOTAL LENGTH OF PARTS FROM 13" BAR STOCK** _____

**LENGTH OF SHORT END SCRAP** _____

**WEIGHT PER INCH OF BAR STOCK YOU USE** _____

**WEIGHT OF SCRAP PER 13" BAR** _____

**COST PER POUND OF BRONZE YOU USE** _____

**COST OF SCRAP PER BAR** _____

Now multiply the cost of your scrap by the numbers of bars you use per month and you can see how much short-end scrap is costing you.

If you want to save this money, buy Asarcon Bronze rods, tubes and shapes in exactly the length you need up to 105"; and in any diameter up to 9". Talk to your nearby Asarcon distributor, or write to us directly. We'll be happy to show you how other companies are turning bronze scrap-end losses into profits.

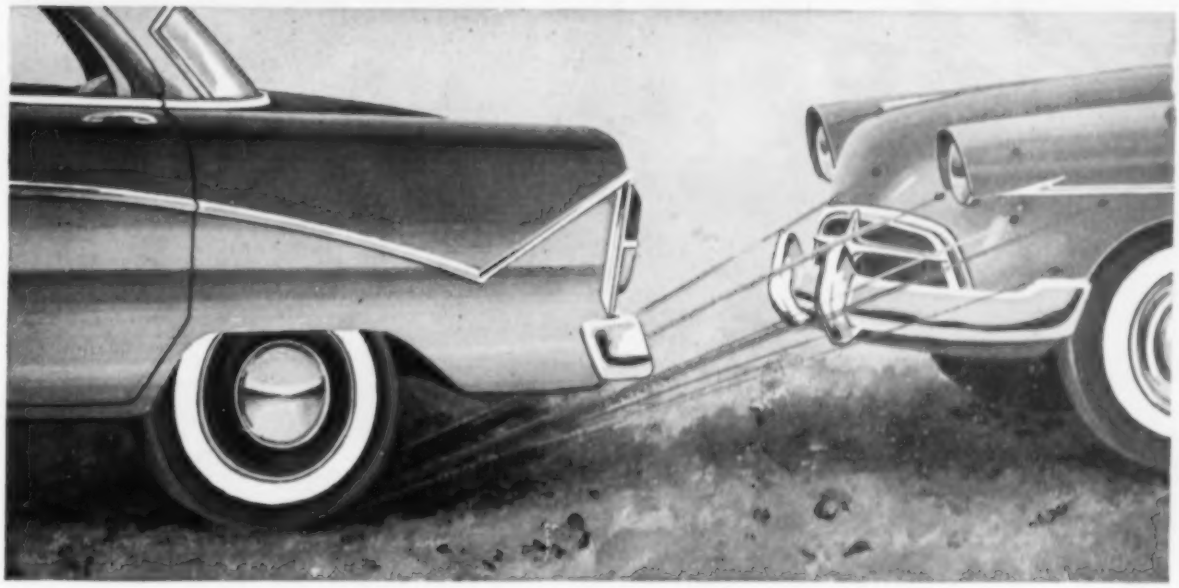
**Continuous-Cast Products Department**

**AMERICAN SMELTING AND REFINING COMPANY**

Perth Amboy Plant, Barber, New Jersey • Whiting, Indiana
WEST COAST SALES AGENT: Kingwell Bros. Ltd., 457 Minna Street, San Francisco
IN CANADA: Federated Metals Canada, Ltd., Toronto and Montreal

ASARCO

# NOW—Startling impact and corrosion resistance under organic finishes...



## with this NEW zinc-manganese phosphate coating—

# PENNSALT FOSBOND 64!

Give rough-used painted metal surfaces the utmost protection from impact and corrosion—give them new FOSBOND® 64 zinc-manganese phosphate protection! Glossy organic finishes on steel surfaces such as auto bodies, appliances, and furniture stand up far longer under sharp, paint-chipping impacts when they've been locked on with Fosbond 64. Steel surfaces treated with Fosbond 64 resist corrosion from severe weathering far longer than steel treated with other phosphate coatings.

The outstanding protection offered by Fosbond 64 is the result of completely new thinking in phosphate coating. Fosbond 64 offers you a *new high* in reliability.

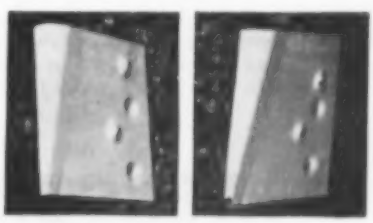
**GET THE WHOLE STORY.** If your product must withstand severe impact *and* severe corrosion, learn how Fosbond 64 protects against *both!* Call your Pennsalt man, or write Metal Processing Department 314, Pennsylvania Salt Manufacturing Company. East: Three Penn Center Plaza, Philadelphia 2, Pa.; West: Woolsey Bldg., 2168 Shattuck Ave., Berkeley 4, Calif. In Canada: Pennsalt Chemicals of Canada, Hamilton, Ontario.

**Pennsalt Chemicals**

Metal Cleaners • Phosphate Coatings • Cold Working Lubricants

**CHIP-RESISTANCE.** Test panels pre-coated with Fosbond 64 take twice as many inch-pounds of impact (on standard DuPont Chip Tester) as finish applied over conventional zinc-phosphate coating.

**SALT-SPRAY TEST.** After 300-hour exposure, Fosbond 64 (left) allows no creep of corrosion under paint, while conventional zinc-phosphate coating (right) shows ⅛" undermining of paint film.



**IMPACT TEST.** Paint applied over Fosbond 64 (left) doesn't fracture on direct and reverse impact and bending over conical mandrel, while paint over normal zinc-phosphate coating (right) fractures from same treatment.

A BETTER START FOR YOUR FINISH

# sheets and strip

## every requirement, cut to size, ready to use

When you need sheet and strip steel, cut to size and ready to use—call Ryerson. The separate sheet and strip division at your nearby Ryerson plant can handle practically any and every requirement for these products. And a staff of specialists working with the very latest equipment assures quick delivery of material in excellent condition—accurate to size and carefully strapped and skidded.

You draw on stocks of more than twenty different kinds of sheet steel at Ryerson—hot rolled, pickled and oiled, cold rolled, galvanized, deep drawing and many others. And ton upon ton of coil stock in many gauges are also on hand. To transform these stocks into blanks, straight lengths, coils, etc., efficient Ryerson shearing, slitting and edging equipment and cut-to-length lines, which turn coil steel into flat sheets of any measure are all at your service.

Ryerson sheet and strip specialists stand ready to help you with your selection and fabrication problems. So, when you need sheets and strip—and any other kind of steel—call on the specialists. Call your nearby Ryerson plant.

**RYERSON STEEL**

*In stock: Bars, structurals, plates, sheets, tubing, alloys, stainless, reinforcing, machinery & tools, etc.*

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

STEEL
June 18, 1956

# Metalworking Outlook

## GNP: $400 Billion in '56

Look for the gross national product to slump to an annual rate of $398 billion in the second and third quarters, then revive to a $405 billion to $410 billion annual rate in the last three months. For the year, the total should be close to $400 billion, up $13 billion from 1955 despite the slump in autos. GNP has been increasing about 3½-per cent a year, may hit some $545 billion by 1965 (in terms of 1956 dollars).

## Prospects for Prices

Part, but not all, of the increase in GNP this year will come from price hikes, especially in the second half. When the expected steel price increase arrives (probably to range from $8 to $15 a ton), watch for the fanning-out effect of that boost to send the wholesale commodity price index up 1 point a month for four to six months.

## Capital Outlays Bolster Economy

Capital plant and equipment spending is one big reason why the economy is going so well. The $34.9-billion outlays expected this year (see page 101) would be up 21.5 per cent from 1955's. But even the 1956 record will probably be short-lived. Many indications now point to still more gains in 1957. Spending next year could hit $38 billion to $40 billion.

## Growing Electronics

Electronic manufacturers expect to sell $5.5 billion worth of equipment in the 1955-56 fiscal year (August to August). That compares with $5.25 billion sold in the last fiscal year, reports Radio-Electronics-Television Manufacturers Association. RETMA estimates dollar volume of radios, TV sets, phonographs and other amusement devices will reach $1.4 billion this year, compared with $1.5 billion last year. Industrial and commercial products are up from $625 million to $775 million. Military products exceed $2.5 billion, up more than $125 million from the preceding year. Replacement part sales will reach $780 million, versus $725 million last year.

## Electric Heating: Expanding Market

A growing metalworking market is equipment to heat homes electrically. Some 300,000 homes are heated that way now. The National Electrical Manufacturers Association estimates nearly 1 million houses will have it in 1960, 3 million by 1966. The industry's sales in 1955 were about $12 million.

## $14 Billion in Repairs, Maintenance

More than $14 billion will be spent in 1956 for improvement, maintenance and repairs to 11 million homes. Electrical modernization alone will run

Technical Outlook—p. 147 Market Outlook—p. 215

at least $6.25 billion. Inadequate home wiring has become a major limiting factor in sale and use of appliances.

## Strike in Alabama

The eight-week-old strike of 264 trainmen at U.S. Steel Corp.'s Birmingham district has forced layoffs of about 50,000 in Alabama alone. Now, there's little chance of settlement before the steel negotiations are resolved. The majority of fabricators in the state get 60 to 70 per cent of their steel from the Tennessee Coal & Iron Division of the corporation. Among those laid off are 25,000 steelworkers at TCI.

## General LeMay's Plea

Gen. Curtis E. LeMay, head of the Air Force's Strategic Air Command, wants an additional $3.8 billion to step up purchases of B-52 bombers, add new bases and personnel. Some congressmen are sympathetic to the request, but chances of AF getting anything near the amount asked are slim. The move would unbalance the long awaited balanced budget, a bad development politically in this election year. Another question: Could the Air Force maintain and man the additional craft? Earlier testimony by other officers pointed up a serious shortage of good maintenance men. Air crews are none too plentiful, either.

## Fund Drives Annoying? Try This

Employees at National Automatic Tool Co. Inc., Richmond, Ind., don't have the problem of coping with too many charitable fund drives. They voluntarily contribute to their Employees Federated Donation via payroll deductions. A committee determines which organizations to support and what proportion of the fund each will get. Payroll deductions continue indefinitely until the employee elects to increase, decrease or drop the plan. Result: No fund drives are made within the company. The employee gets tax deduction advantages he might not receive if he made hit and miss donations without keeping records. Organizations are happy because individuals tend to contribute more under such a plan.

## Straws in the Wind

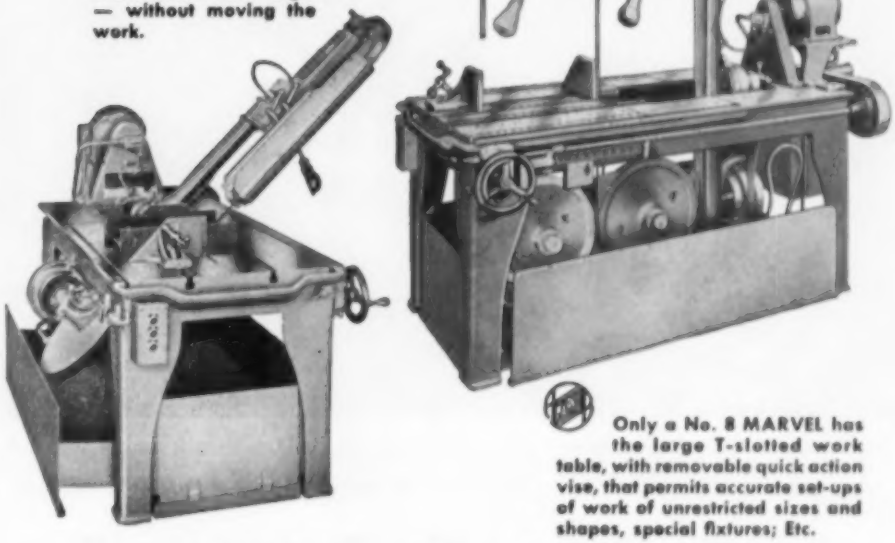
Auto industry spokesmen are attacking federal regulation of auto distribution proposed under a bill by Sen. A. S. Mike Monroney (Dem., Okla.); it would force manufacturers to buy back unsold cars from dealers. . . International Business Machines Corp. denies all charges brought against it by Sperry Rand Corp. in the $30-million antitrust suit filed last December; IBM files a counterclaim against Sperry Rand, charging infringement of 35 patents. . . Westinghouse Electric Corp. plans most of its expansion moves outside Pennsylvania because of the high tax rates there. . . Almost $52 million in federal funds will go for airport construction and improvement in fiscal 1957.

# Never Confuse the No. 8 MARVEL with an ordinary Band Saw

***...only the MARVEL is Universal***

Only on a MARVEL No. 8 does the blade remain at a right angle throughout its full 18" feed traverse. Work always remains stationary.

Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.



Only a No. 8 MARVEL can do all of these things: Snip-off a ⅛" rod or cut-off an 18" x 18" cross section

Rough to Size and Shape

Miter

Index

cut off and shape Structural Beams.

Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures; Etc.

## "Rough Machine" to size and shape with minimun chip waste

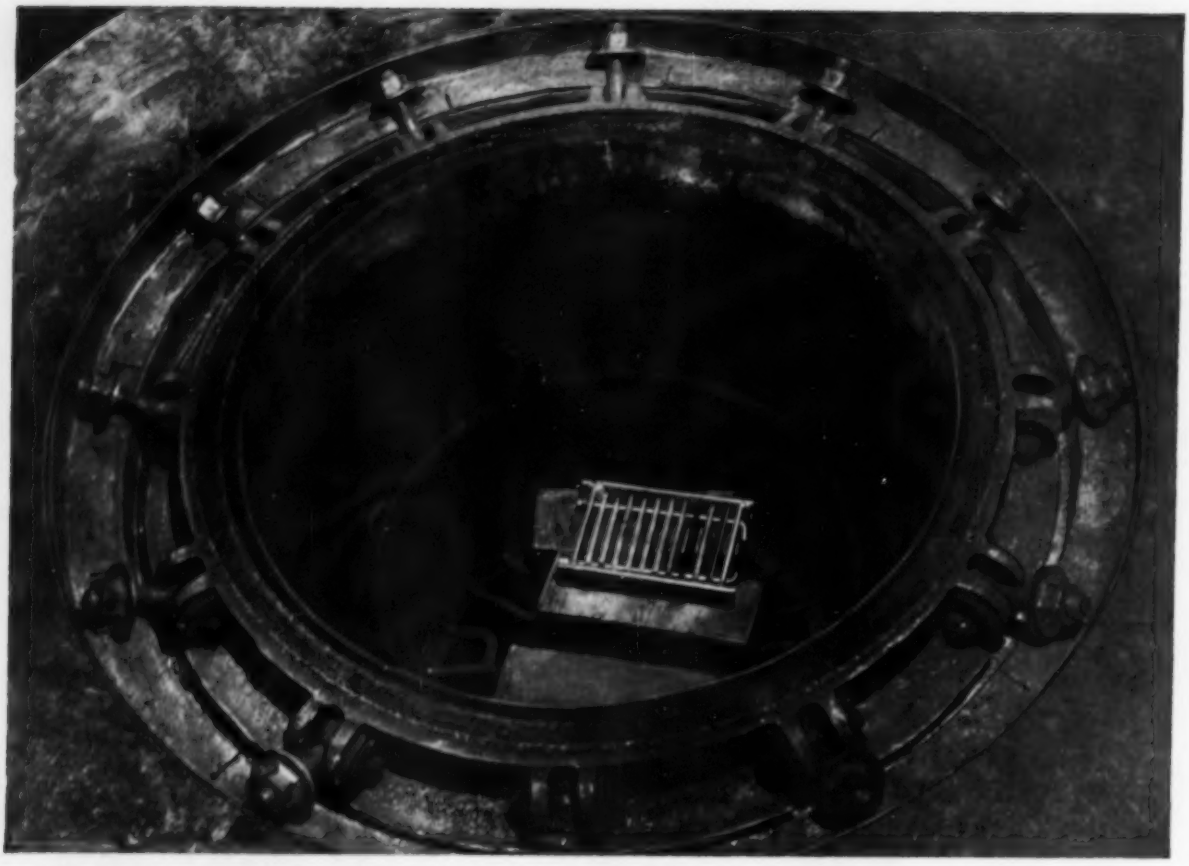
The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.

**MARVEL** *Metal Cutting* **SAWS**

Better Machines–Better Blades

**ARMSTRONG-BLUM MFG. CO.** • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.



***Investigation of metal behavior*** in actual industrial environments is facilitated by the installation of a heat-resistant, alloy test rack containing numerous metals and alloys. Here is such a test rack, installed for a dozen carburizing cycles in a pit-type, circular Hevi-Duty furnace at Benedict-Miller, Inc., Lyndhurst, N. J.

# Is performance at High Temperature Your problem?

## *Perhaps INCO can help you*

Performance of a material at 1000°F. or above depends upon composition, structure, mechanical and other properties.

But it is the interdependence of these properties that may determine optimum performance.

INCO has tested many metals and alloys for high-temperature performance. In all sorts of plants, under actual operating conditions.

The result? Thanks to test methods initiated by INCO's High Temperature Engineering Service, we have a fund of valuable information. It includes data on load-carrying capacity, corrosion rates, resistance to scaling and other relevant information on performance of materials tested at high temperatures . . . in a wide variety of atmospheres.

We will gladly help you find answers to your high-temperature difficulties in your own plant. Fill in the coupon for a High Temperature Work Sheet . . . on which you can easily outline your problem to us.

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INCO **THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street New York 5, N.Y.

# Horizons Unlimited

The irresistible pressure of the American people for more goods and more time to enjoy them in a nation that is preparing to repel an atomic invasion is stimulating new and unlimited horizons for metalworking.

This year, the gross national product (total output of goods and services) will establish a new record of nearly $2400 per capita. That's more than three times the prewar figure, one and a half times that of the first postwar year. The figure (in current dollars) may reach $3200 by 1965. Within three years, expanded expenditures for defense will include $2 billion a year for guided missiles alone.

The challenge is clear. In the immediate years ahead, America must increase her production one-third. But her work week will tend to shrink toward five days or 30 hours. Her work force is not growing as fast as her total population. Her materials are not adequate for all the jobs on the drawing boards or about to emerge from men's minds.

It's no wonder that industrial and government-financed research this year are at a new high of $4.5 billion—up $400 million from 1955, $750 million from 1954.

Many of the products of this research (detailed in No. 5 of STEEL's Program for Management Series in this issue) were yesterday's daydreams. Any day, aircraft will be streaking across the sky at speeds of 2000 to 3000 mph. With refrigerated skins, they promise to hit 7000 to 14,000 mph. The next step: Lunar ships.

Note the emphasis on new materials and their complete exploitation. You have a stake in this whether you're making supersonic airplanes or more prosaic things like storage tanks, automobiles, air conditioners or pole line hardware.

Much progress has been made. Less bulky, heat treated carbon steels are being made available for constructional uses. New alloy steels can be welded without subsequent stress relieving. Stainless steels can be machined and hardened without distortion. Vacuum-melted metals are invading the investment casting field. Copper strip for heat exchangers has the tubing "built in." New aluminum alloys provide high strength without heat treatment.

Joining hands with materials is a parade of new and improved methods for fabricating them into finished products.

And in this era of electronic wizardry, substitutes are being found for brains as well as muscle.

Nothing seems impossible.

The horizons are truly unlimited!

Irwin H. Such

EDITOR-IN-CHIEF

## WHY THE FEED BAG BECAME A FLOWER POT

Remember horses? They were strong, kindly four-legged animals and they used to be essential in our lives, particularly on the farm. Then, in just a few short years, the farm equipment industry changed everything. Today's mechanized farmer produces more with less work, and enjoys more of the good things of life. Improvements in farm equipment have often gone hand-in-hand with progress in steelmaking. And, at Inland, we've been working for many years at the job of producing the *right* steels for better farming.

**INLAND STEEL COMPANY** *38 South Dearborn Street, Chicago 3, Illinois. Sales Offices: Chicago, Milwaukee, St. Paul, Davenport, St. Louis, Kansas City, Indianapolis, Detroit, New York. Steel products supplied to the farm equipment industry include hot and cold rolled sheets and strip, Ti-Co galvanized sheets, bars. Other products: plates, structurals, 4-Way safety plate, tin mill products, reinforcing bars, rails and track accessories, coal chemicals.*

INLAND

Source: STEEL's Industrial Production Index (on vertical scale, 1947-1949 = 100)

# If There's a Steel Strike

**To have time for orderly shutdowns, if necessary, management and labor had a gentlemen's agreement to seek settlement by June 17. If none's reached, here's what could come**

WHAT happens to the economy if a steel strike starts at midnight, June 30? If we have a 53-day walkout as we did in 1952:

Only 95 million net tons of steel ingots would be produced this year, instead of 125 million.

Only 5.2 million autos would be sold, instead of 5.8 million.

**The national economy would lose $5 billion in sales and wages.**

**The federal government would lose $1 billion in taxes.**

**1952**—In the 53-day strike four years ago, steel ingot production hung at 12 per cent of total capacity. Operations dropped from 102.5 per cent of capacity to 37.5 per cent in the first week.

In 1952, the industry produced about 93 million tons of steel, with operations averaging 85.8 per cent of capacity. Lost because of the strike: About 15 million tons. In the same year, auto makers produced 5.6 million cars and trucks. Strike loss: About 600,000 units.

**Stocks Up**—Cutbacks in metalworking production during the 1952 strike were not serious until the fourth week. Metal users had been stocking up prior to the strike, as they have been doing this year.

**The production cutbacks soon turned to plant shutdowns as the strike entered its fifth week.**

During the week of July 4, freight car loadings hit an 18-year low, because of the combined force of the strike, Independence Day and the coal miners' holiday.

**Recovery**—A strike isn't over as soon as the plants reopen. It takes up to two weeks to get a blast furnace back in operation; industries dependent on steel must stand in line for the material.

You can look for a strike (if it comes off) to be inflationary all the way around in 1956. Wages will be boosted; steel prices will be raised; steel will be in shorter supply than ever.

After the 1952 strike, there was no real scramble for steel because the market still tended to be a buyer's market.

**Labor's Loss**—Last but by no means the least of the losses that a strike can cause is the individual worker's earnings: In 1952, each steelworker was out about $650 in cold cash. At 1956's higher wage scale, it would cost him more.

**1949**—In the six-week tussle between steel labor and management seven years ago, steel production dropped to about 7.5 per cent of capacity (rated annual capacity was 96 million tons). Before the strike began, the industry was operating at a rate of 86 per cent of capacity. The year ended with a total steel production of about 78 million tons, a loss of 5 million to 10 million tons because of the strike.

In the first week of the 1949 strike, STEEL's industrial production index dropped 40 points (see chart). There was a 60-point drop during the first week of the 1952 strike.

**Sustained**—For the first three weeks of the 1949 strike, auto production tended to sustain the index. In 1952, it wasn't until the fifth week that autos really started to slide (from 124,000 to 87,000 units). By the last week, auto production stood at a meager 32,000 units per week.

**With autos slowing down now, there will be little sustaining effect from that quarter in case of a strike this year. The fanning-out effect of a walkout in 1956 would be more rapid than in previous disputes.**

## UAW Proposal: Already at Work

Did you get a good deal on the old jalopy last January when you traded for a bright new Zoom 8?

If Walter Reuther, president,

United Auto Workers, has his way, another of life's little satisfactions will be gone. Mr. Reuther has proposed that the auto companies cut their list prices during the slack selling months, so that new cars move faster and auto worker layoffs are held to a minimum.

**In Effect** — Say auto makers: When times are good, dealers get the maximum markup; when times are bad, they offer bigger discounts and trade-in allowances.

So dealers beat Mr. Reuther to the punch without involving the factory. A Big Three spokesman added that contests and bonus plans sponsored during slack sales months also do the same job.

Speaking before the mayors of over 40 midwestern communities affected by the current auto layoffs, the UAW prexy also proposed an increase in personal income tax exemptions (from $600 to $800), and a federal moratorium to protect workers not able to make payments on home mortgages.

**Union Speaks Soprano**

Bargaining for a new steel contract may be benefitted by a feminine touch this year. Mrs. Beatrice Reagan of Cleveland is the first woman to represent a local as a member of the United Steelworkers negotiation committee

## Buyers' Questionnaire for 1956

(Per cent of Respondents)

| Are your inventories | May | Apr. | Mar. | Feb. | Jan. |
|---|---|---|---|---|---|
| Larger? | 31 | 44 | 36 | 36 | 39 |
| Same? | 55 | 45 | 56 | 53 | 52 |
| Smaller? | 14 | 11 | 8 | 11 | 9 |

Source: Purchasing Agents Association of Chicago

*Buyers' hopes for the second half still run high as . . .*

# Inventories Are Bright Spot

NO SERIOUS recession is expected by the Purchasing Agents Association of Chicago.

The business survey committee of the association reports that 43 per cent of member buyers expect present business conditions to continue through the second half. About one buyer out of four thinks business will improve, while one out of three believes conditions will slow down even more.

**Bright Spot**—In the past, says the buyers' group, forced liquidation of inventories has preceded a major downturn in business.

Inventories are felt to be in a healthy state (see table). The replies to the inventory question on the survey show this: 1. The number of companies reporting larger inventories is the lowest so far this year. 2. The number reporting smaller inventories is the highest so far this year.

**Backlogs**—The May 31 survey shows a decline in order backlogs. Now, 17 per cent of the buyers say backlogs are larger than they were a month ago, and 38 per cent report they are smaller. In the previous month, the percentages were 30 and 27. About 45 per cent say they remain unchanged from last month's.

Employment experienced a slight drop, say the Chicago buyers. Other factors: Deliveries showed some improvement; prices were steady to a little lower; production was down a little.

**Buying Policy**—Lead time for ordering new materials also reflects a slowdown in the last month. The percentage of buyers ordering 90 days or more ahead dropped from 9 to 6 per cent. There was a drop from 35 to 30 per cent among buyers giving 60 to 90 days of lead time; and a gain from 44 to 52 per cent for the 30 to 60 day class.

### AF Awards Contracts

The Air Force has awarded an $11,892,490 contract to Lockheed Aircraft Services Overseas Inc., an affiliate of Lockheed Aircraft Corp., Burbank, Calif. Lockheed will assist Kawasaki Aircraft Co. Ltd. in building T-33 trainers for Japanese defense forces.

An $8-million contract went to American Bosch Arma Corp., Garden City, Long Island, N. Y., for fire control systems. Radio Corp. of America's engineering products division won a $6,333,985 contract for radio power supply controls.

Studebaker-Packard Corp., Detroit, was awarded a $1,050,000 contract for the acquisition of tools and machines for the production of J-57 jet engine components. (This is in addition to a $1.4-million contract received in December.)

International Business Machines Corp., New York, received a $1,284,053 contract for services in connection with navigational computer equipment for bombing.

# How To Spur Foreign Sales

**National Automatic Tool Co. suggests using foreign dealers as a starter. Even a minor percentage of volume in overseas trade can help stabilize operations at home**

IF YOU'RE considering the development of foreign markets, don't overlook the use of established foreign dealers as a starting point.

1. It's comparatively easy to break into the foreign market this way. 2. You can keep overseas personnel to a minimum. 3. It takes only a small staff in the home office to co-ordinate the program.

**Case in Point**—"That has been our experience at National Automatic Tool Co. Inc.," says K. P. Martin, vice president-sales. "When domestic business is good, the foreign markets are not too attractive because it costs more to sell overseas. But when business is depressed, foreign sales can become important. They often spell the difference between operating in the red and making a profit, and this increased business helps to keep your work force intact—an important consideration when you have a high ratio of skilled workers."

On the average, about 10 per cent of Natco's business is in foreign trade. The stabilizing effect was particularly notable in 1949—the postwar slump year for machine tools—when foreign business accounted for 25 per cent of Natco's volume.

**Plus Value**—One of the big advantages of using dealers in foreign countries, Mr. Martin points out, is that you can avoid most of the red tape and paper work involved in arranging for licenses, dollar exchanges, credit, etc. This is all handled by the dealer or customer with his own government.

Probably the most important man in this type foreign selling is your company representative—the front man overseas. Natco has two reps in Europe—one in England, one in France—who work with 24 dealers in all the Western countries.

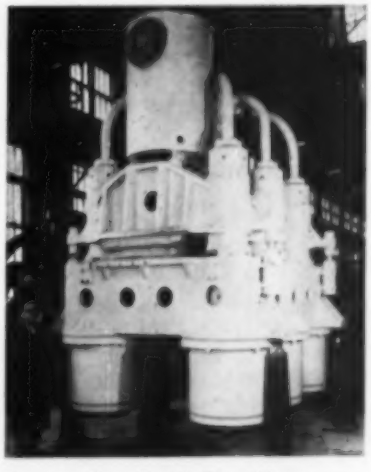
The representative must be free and willing to travel almost constantly. He's the good-will builder among dealers and customers. He handles engineering problems, helps the dealer close sales.

**Pick the Dealer**—Your selection of dealers is an important one, and a good starting point is to obtain directories of dealers in each country. Check: What's the dealer's reputation? What products does he handle, and is yours one he'll give adequate attention to? What customers does he contact? Is he familiar with his country's import licensing and dollar exchange procedures, and does he have good governmental contacts to speed this work through?

In the home office, says Mr. Martin, handling quotations is of prime concern. Because the distance factor gives your foreign competitors a certain time advantage, you should be as prompt as possible in returning your bids. Natco's quotations take from three weeks to two months.

**Payment** — Natco handles payments for its equipment through a New York bank and gets a 30 per cent deposit with the order when placed. The company receives the balance before the equipment leaves this country.

"There are many opportunities in the foreign market," Natco's vice president emphasizes. "Our reputation for quality is probably our biggest asset—many of our products carry price tags 40 per cent higher than the foreign competitor's. But American manufacturers still lead Europe's in the high-production techniques—this know-how is in demand."



**Press for Roll Bonding**

*This 1500-ton hydraulic sizing press is one of three designed by Hydropress Inc., New York, to produce heat exchanger panels for refrigerators and other similar units by the roll-bond process. The method was originated by Olin Mathieson Chemical Corp.*

# To Process Own Steel

**American Can will buy stock in coils before it has been inspected, treated or cut**

THE FIGHT between the steel and can companies is getting rough. William C. Stolk, president, American Can Co., says his firm will spend $27 million in two years to process its own steel.

Included will be a $7-million plate processing plant in the Chicago area, and $5 million for facilities at Hillside, N. J.

**Do-It-Yourself** — Within two years, says Mr. Stolk, American Can will be processing between 75 and 85 per cent of its tin plate and black plate requirements.

Mr. Stolk termed this as "drastic action and a possible preview of a trend in the entire industry." American Can buys $400-million worth of steel annually.

**Rising Costs**—Sheet costs have risen 91 per cent since the end of World War II, but can prices are up only 75 per cent, notes Mr. Stolk.

The basic element in the new operations will be shearing lines, which will include machinery for unrolling the coils, inspecting the plate, shearing it and sorting and stacking the sheets.

**Additions**—Following the 200,000-sq-ft Chicago area plant, there will be additions at Oakland, Calif., and Tampa, Fla. New processing equipment will also go in at New York, Baltimore, Los Angeles, Texas and a number of other areas.

Mr. Stolk concluded that the company's move into steel processing was motivated by new developments, including the growing use of chemically treated steel in place of tin plate.

# U.S. Homes: Cooling Off

**"Both old and new homes without air conditioning will be obsolete in two-thirds of the U. S. in less than ten years," says Frigidaire. Other producers are equally optimistic**

Even though the spring featured cool weather, manufacturers of air-conditioners have been able to gloat over sales returns. Most producers will show gains of 25 to 50 per cent over last year's totals.

Predicts M. G. Munce, vice president, York Corp.: The retail value of room, self-contained and year-round residential air conditioning equipment will total $1 billion in 1956. Sales of other types (industrial, central station, custom engineered, field assembled systems) are estimated at $500 million.

**Who Buys** — The South and Southwest are still the leading purchasers of all types. "But," reports Airtemp Division, Chrysler Corp.: "A surprising development is that the highest sales volume on housing projects is being reported from the northeastern states." H. M. Carnahan, Airtemp sales manager, adds: "Our residential central air conditioning sales are running 50 per cent ahead of those in the same period last year."

**Small Models**—Room units (window boxes and small console models) are not on the way out. Reports General Electric Co.: "We expect a phenomenal rise in room unit sales in the next ten years." Estimates Westinghouse Electric Corp.: "We feel that the sale of window-type units will continue to increase during the next two or three years. It may be at a slightly lower rate." Westinghouse predicts that its room air conditioning sales this year will top '55 totals by some 60 per cent. While the central system is growing in popularity, window box manufacturers point out that the small room unit still provides great flexibility and that in older homes it may be the only economical approach. Example: A home equipped with hot water heat would have to convert to hot air heat or put in separate ductwork to have central air conditioning.

**Central Systems**—Reports Cloud Wampler, chairman, Carrier Corp.: Sales of residential central systems are running 50 per cent ahead of those in the first quarter of 1955. Retail sales may hit 200,000 units this year.

**Improvements**—The growing interest in central air conditioning is attributed in part to the trend to air cooling rather than water cooling. "In analyzing our residential central system sales through April," reports one manufacturer, "we found that about 95 per cent involve waterless equipment." Reason: When a central system can be integrated with a present heating plant, the cost of air conditioning can be as little as $700, plus installation charges. Philco Corp. explains that sales are being helped by the development of simplified equipment and the introduction of easier installation methods. The availability of a 2-hp unit for attic or crawl space areas is bringing in more sales, too.

**Problems** — Makers of central systems still have to sell the builder.

M. M. Lawler, vice president, Worthington Corp., explains: It appears that contractors are reluctant to increase the selling price of their homes by incorporating the extra feature of year-round comfort. But most new homes are being built so that summer cooling can be added by the owner at minimum expense. Worthington's sales outlook for central systems: A 25

per cent gain over last year's.

American Radiator & Standard Sanitary Corp.'s Air Conditioning Division reports: "We expect that the makers of residential central systems will be selling some 400,000 units annually by 1960."

**Commercial Vs. Home**—Typhoon Air Conditioning Co. points out that on a tonnage basis the commercial market may continue to exceed residential installations for another five years. Says Typhoon: "While residential installations may run into the millions, the air conditioning tonnages involved usually run from 3 tons to 8 tons. It will take many homes to balance out the numerous 200 to 400 ton commercial jobs. And our commercial sales will jump about 25 per cent this year." Another viewpoint: Rheem Mfg. Co. says: "Home installations (central systems) will continue to be our more important market."

**Industry**—The production line is getting its first taste of cool summer air. Examples: 1. In Indianapolis, a manufacturer of precision parts has air conditioned his entire plant. 2. The Convair plant at Ft. Worth, Tex., is equipped with some 13,000 tons of equipment to air condition the entire facility.

D. C. Minard, president, Trane Co., reports: "Our industry has the equipment to do a sound air conditioning job on industrial plants. What we need is a new approach to the types of systems industry needs. Maybe we should think in terms of just cooling the bottom 8-ft layer of a production area. Perhaps we should develop spot cooling. This would enable employees to have their own cooling equipment which they could turn on and off. We have to think in terms of the individual industrial job—whether it be a sewing machine producer or a steel mill." Adds Typhoon: "We are going into every industrial plant we can reach in the U. S. to promote the benefits of industrial air conditioning."

**Gas, Too** — Servel Inc. reports: "The residential air conditioning market is extremely important to the manufacturers of gas air conditioning equipment, since it affords an opportunity for mass production, quantity sales, a more compact and better product at reduced prices."

## New Plant and Equipment Expenditures

(Millions of dollars)

| | 1955 | 1956 1st Qtr. | 1956 2nd Qtr.* | 1956 3rd Qtr.* | 1956 4th Qtr.* | 1956 Total* |
|---|---|---|---|---|---|---|
| Manufacturing | 11,439 | 2,958 | 3,979 | 4,046 | 4,053 | 15,036 |
| Durable goods | 5,436 | 1,462 | 2,036 | 2,127 | 2,060 | 7,685 |
| Iron & steel | 863 | 219 | 328 | 357 | 423 | 1,327 |
| Nonferrous metals | 214 | 69 | 102 | 119 | 128 | 418 |
| Electrical machinery & equipment | 436 | 104 | 147 | 146 | 182 | 579 |
| Machinery, except electrical | 809 | 227 | 280 | 275 | 234 | 1,016 |
| Motor vehicles & equipment | 1,128 | 341 | 498 | 531 | 493 | 1,863 |
| Transportation equipment, excluding motor vehicles | 274 | 77 | 121 | 140 | 139 | 477 |
| Stone, clay & glass | 498 | 132 | 197 | 213 | 143 | 685 |
| Other durable goods | 1,214 | 293 | 363 | 346 | 318 | 1,320 |
| Nondurable goods | 6,003 | 1,496 | 1,943 | 1,919 | 1,993 | 7,351 |
| Mining | 957 | 262 | 292 | 312 | 275 | 1,141 |
| Railroad | 923 | 297 | 368 | 356 | 286 | 1,307 |
| Transportation other than rail | 1,602 | 396 | 436 | 458 | 494 | 1,784 |
| Public utilities | 4,309 | 936 | 1,360 | 1,431 | 1,262 | 4,989 |
| Commercial & other | 9,471 | 2,613 | 2,706 | 2,627 | 2,690 | 10,636 |
| TOTAL | 28,701 | 7,462 | 9,141 | 9,230 | 9,060 | 34,893 |

Source: Commerce Department, Securities & Exchange Commission
* Estimated

# Capital Spending Holds Up

THIRD QUARTER expenditures for new plants and equipment should hit a seasonally adjusted annual rate of $36.7 billion, say the Securities & Exchange Commission and the Commerce department.

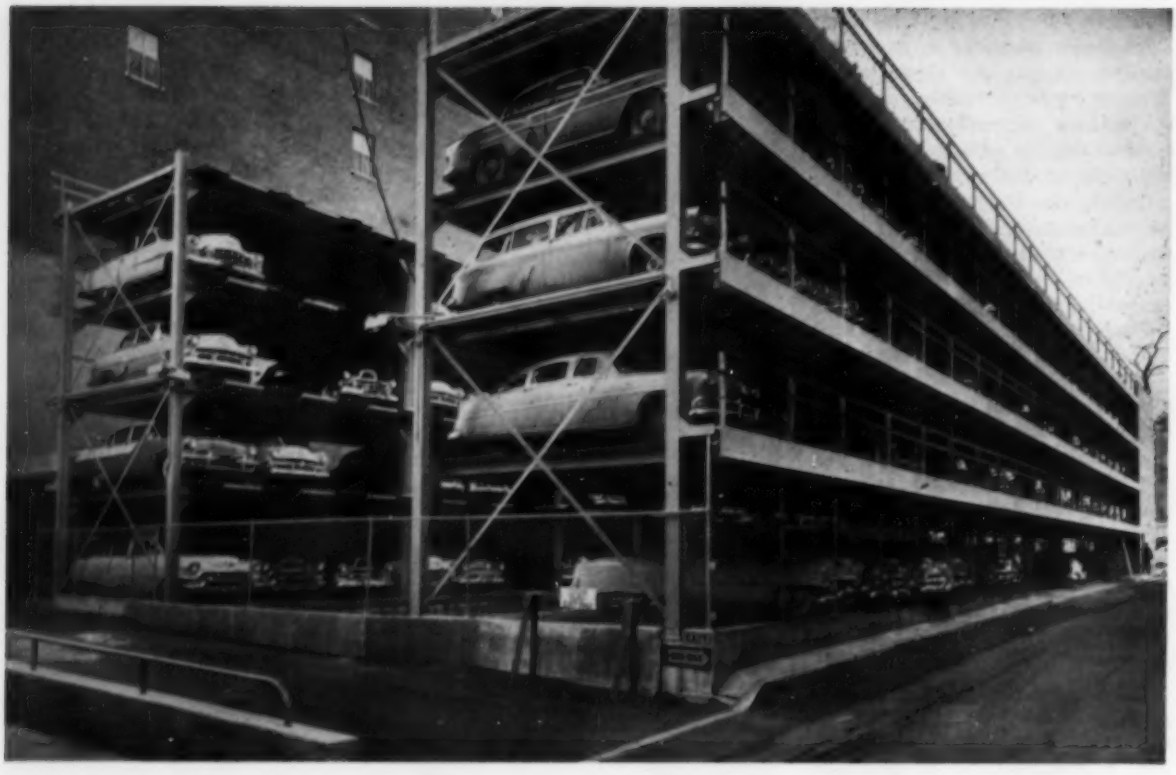
Total outlays for the year will be almost $35 billion (STEEL, Mar. 26, p. 85). STEEL's estimate of fourth quarter spending (see table above) is the difference between Commerce-SEC estimates of the first three quarters and the total amount predicted earlier.

**Deferments** — Businessmen are generally holding to their initial plans for record capital spending this year, although some spending scheduled for the first half has been deferred to the second half.

First quarter spending was at an adjusted annual rate of $32.8 billion; the Commerce-SEC survey estimates the second quarter rate at $34.8 billion.

**Big Get Bigger**—In the manufacturing field, companies with assets of more than $50 million expect to spend almost 50 per cent more in the first nine months of 1956 than they did in the same period last year. The planned increase for all manufacturing is about 40 per cent more.

While equipment prices and construction costs are up since last summer, most of the increased spending represents increased productive facilities, the survey says.



*Steel helps to relieve a growing headache with . . .*

# More Parking Garages

STRUCTURAL steel is helping downtown catch up with one of its most pressing problems—"Where ya' gonna' park?"

Private parking lot owners put up an estimated $250 million in new construction last year, and that will be "greatly exceeded" this year, comments the National Parking Association, spokesman for the $4.5-billion private parking industry.

**Growing Up**—Evidence that the parking business is healthy is the price tag on garages—six-figure costs aren't unusual, with some large ones in the half-million-dollar bracket. A few go even higher.

Highlighting the building program is a trend to steel construction, a shift expected to accelerate as: 1. More cities revise outdated building codes to permit steel construction. 2. Structurals become easier to get (some lot owners have returned to reinforced concrete as their second choice).

**Here's Why** — Claimed advantages of steel construction are lower first cost, faster building and, strange as it may seem, greater portability—if an owner doesn't like his location or gets a good offer for his high-priced land, he can take his building down and move across town. Bolted construction makes for almost 100 per cent salvage.

For speed, the American Institute of Steel Construction points to a case in Pittsburgh where structural steel and high strength bolts saved an estimated three months of construction time.

**More Steel**—Tied in with the use of structurals is use of steel flooring and porcelain enamel panels for siding. Closely spaced, vertically hung wire ropes often take the place of conventional sidewalls.

Automation in the business also adds to the steel take. For those who shudder at the sight of seeing the parking lot attendant slam Old Bessie into low gear and peel rubber, there are garages where your car is untouched by human hands. An automatic elevator system handles the whole operation, parking and retrieving the car. (Progressive lot owners fight a continuous battle to get rid of the "jockeys.")

Bowser Engineering Co., Des Moines, Iowa, and Union Industrial Co., a division of Alliance Machine Co., Alliance, Ohio, are two companies in the automatic parking machine business.

**No Hands** — Another device (made by Western Railroad Supply Co., Chicago) does away with the parking lot attendant. The customer drops his money in a coin slot and enters the lot when a gate arm similar to those at railroad crossings goes up. The arm comes down quickly enough to prevent a

second car from parking on the same coin.

A similar attendant-free system is made by Parking Corp. of America, a division of Johnson Fare Box Co., Chicago. Inland Steel Co. has a Parking Corp. installation.

Putting two cars in the space of one is possible with Skypark, which is made by Simmons Industries Inc., Albany, N. Y. A lift with a car on it is raised in the air, leaving space beneath for another car.

Another slice of the parking business that goes to metalworking: Timekeeping devices, made by International Business Machines Corp. and others.

And then there are the parking meters.

# Hassel on Machine Tools

**A Senate committee criticizes Defense department procurement policies. Pentagon people call for a faster rate of technical progress from builders**

CHARGES and countercharges about machine tools are flying about Washington.

First off is a report by the Senate Small Business Committee that accuses the Defense department of dragging its heels on machine tool buying for modernization and reserves.

**Need for Speed**—From the Pentagon comes a plea for a faster rate of technical progress within the machine tool industry. Assistant Air Force Secretary Dudley C. Sharp approached the matter before industry advisory groups of the Metalworking Equipment Division, Business & Defense Services Administration.

Said Mr. Sharp: "I am calling your attention to this area (of electronic programming and director-control applications to production equipment) simply for the reason that we believe that faster and more extensive progress is an urgent national necessity. The application of electronic programming and director-control mechanisms to machine tools may well revolutionize the future approach to aeronautical manufacture." (For more details on Mr. Sharp's viewpoint, see STEEL, Apr. 9, 1956, page 68.)

**Much Help** — Government men are genuinely grateful to the industry for its co-operation in defense planning and other assistance. The Air Force, too, is apparently ready to give more financial help in developing the new machines that are needed.

Also coming, though slowly, is the modernization speed-up called for by the Senate committee. The Air Force, at least, is pretty sure it can get the needed funds where a potential saving can be indicated.

**Snags**—Prospects for an expanded reserve tool program aren't so bright in spite of the Senate committee's admonition "that Defense officials should give renewed consideration to the Vance Committee recommendations calling for a mobilization reserve of machine tools and related production equipment."

Buying a machine that will save money in current production is one thing; buying one to put away in storage is another—on a budget that Defense people call austere.

**Faint Hope**—The Air Force also hopes modernization will come from increased buying of tools by the aircraft industry itself. But industrial sources say it's not likely that any wholesale buying will result from the prodding because of replacement costs and present depreciation policies. Fast tax write-offs might be some help. Defense officials say what's needed is some more selling by machine tool builders.

But a selling job by the Pentagon will probably have to be done on the senators, who had a good word only for the Navy. The lawmakers called for, among other things: 1. Faster modernization. 2. A new look at reserve requirements. 3. A re-evaluation of the elephant tool program. 4. A review of the government's leasing policy "with a view to establishing a fair rental rate and diminishing the number of government-owned machine tools supplied to private industry where feasible."

**Aluminum Roofing Covers Gypsum Storage Buildings**

Corrugated aluminum sheet is used to roof two dome-shaped buildings for Kaiser Gypsum Co. Inc. Each building is 70 ft high and has a capacity of 35,000 tons of gypsum rock. The roofing reduced deadloads, boosted stability

# Industry Favors Changes

**The Renegotiation Act has been re-evaluated by a House-Senate committee. Industry won't get all it wants, but there will be some help in a new definition**

WATCH FOR a two-year extension of the Renegotiation Act. The recommendation is made by the Joint Committee on Internal Revenue Taxation.

The committee does say, however, that renegotiation should not become a permanent part of the law, but present high levels of military procurement and rapid technological change make temporary extension necessary.

**Industry Favors**—Several important changes looked on favorably by industry are due to be made, though, if the committee's recommendations are followed (and all betting is that they will be):

1. Sales of less than $1 million (instead of the present $500,000) cannot be renegotiated.

2. The standard commercial article exemption will be amended to eliminate the test that competitive conditions will reasonably prevent excessive profits. (That provision has been an added expense to industry and a burden on the board which now must investigate each case.)

3. A standard commercial article will be defined as "an article either customarily maintained in stock or covered by established price quotations." But in either case, at least 35 per cent of the contractor's dollar sales of the article during the fiscal year must be for general industrial or commercial use. Such products will be exempt. The contractor will not have to get approval from the Renegotiation Board.

4. Renegotiation will be limited to purchases by the Defense department, Army, Navy, Air Force, Atomic Energy Commission and General Services Administration. Sales to 14 other agencies now covered will no longer be included.

6. In determining profits on renegotiable sales, losses sustained on renegotiable business in the two preceding fiscal years (rather than the present one year) will be allowed as a carry forward.

It's unlikely that two of industry's hopes will be fulfilled: 1. That contracts containing price adjustment clauses will no longer be subject to renegotiation. 2. That contracts awarded after competitive bidding by three or more firms will not be subject to renegotiation.

## Difference of Opinion

Nothing much came out of Rep. Wright Patman's (Dem., Tex.) query into differences of opinion between the Federal Reserve Board and Treasury Secretary George M. Humphrey on the FRB's last credit tightening move.

*Meet L. T. Willison*: The new director of the Business & Defense Services Administration's Iron & Steel Division is on leave as assistant general manager of sales, Jones & Laughlin Steel Corp. He will serve with BDSA for about six months. He can be reached in Washington at Commerce department, Room 4812. Telephone: Sterling 3-9200, Ext. 4412.

Secretary Humphrey again says he thinks such action was not required at that time. He stated, however, that he isn't alarmed over present tightness in the money market and that the credit picture is only one factor in slack auto sales.

William McChesney Martin, chairman of the FRB's Board of Governors, defends the action as a necessary step in the battle against inflation, and says he counts price stability more important now than credit availability.

## Spending Points Progress

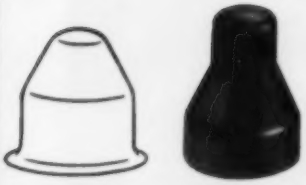
Commerce Secretary Sinclair Weeks, heartened by steady upward progress in plant and equipment spending, record employment and record personal income, points to those factors as "among the latest signs of the inherent health of the economy.

"We have never been on a higher level than now," he adds. Periodic leveling offs in the upward spiral of the nation's economy are to be expected, but the President's goal of a $500-billion economy about 1965 is considerably closer than when it was predicted.

## Shipyards Looking Up

Better times are ahead for shipyards. The Maritime Commission sees 40 to 60 new ships a year (depending on size and type) being built in U. S. yards. A base of 20 per year will come from the replacement programs of the subsidized ship lines; the rest will include tankers and coastal ships built with help from governmental trade-in allowances and mortgage insurance.

Maritime Administrator Clarence G. Morse claims the government's current program brought $485 million to the shipbuilding industry in the year that began last July. He says there are 53 shipbuilding and conversion jobs in shipyards and that at latest count 51 additional new ships will go on the ways this calendar year.



**PREFORM** 1 1⁄16" dia. 1 13⁄16" high

**FINAL FORM** 1 1⁄16" dia. 2 1⁄4" high

**2 OPERATIONS** plus anneal—.032" AMS 5521. Jet engine part formed by redrawing a cup.

**PREFORM** 3 1⁄4" dia. 3 1⁄4" high

**FINAL FORM** 2 1⁄8" dia. 5 1⁄8" high

**PREVIOUS METHOD**

**2 OPERATIONS**—.043" AMS 5540. Jet engine part formed by redrawing a cup. Part at right shows previous forming method of welding two stamped sections together.

**PREFORM** 1 1⁄2" dia. 1 3⁄4" high

**FINAL FORM** 1 3⁄4" dia. 2 3⁄8" high

**2 OPERATIONS**—.020" Hy Mu 80. Part formed by redrawing a cup.

# Hydroforming

*takes less time, less dollars to form tough shapes, tough metals*

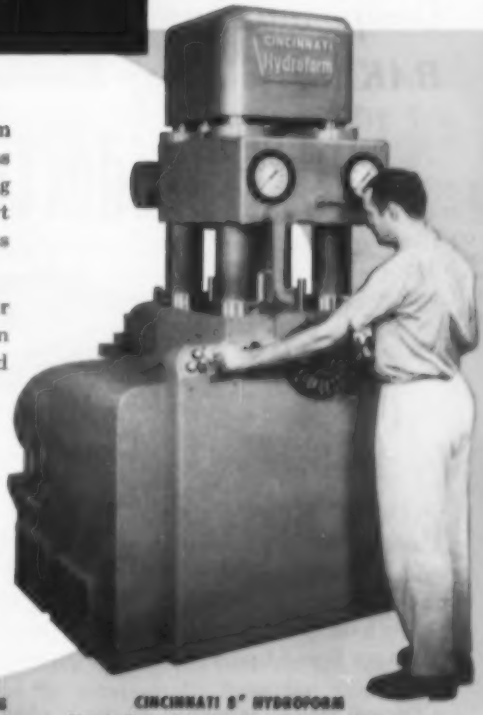
**PREFORM** 1 3⁄8" dia. 1 1⁄4" high

**FINAL FORM** 1 3⁄8" long 1⁄2" wide 1 1⁄2" deep

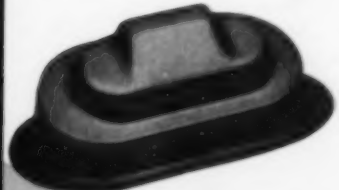
**2 OPERATIONS** plus anneal—.025" Brass. Instrument cover formed by drawing a cup into the final rectangular shape.

■ Shown here are several parts drawn on Cincinnati Hydroform machines. These range from tough shapes of ductile materials to less complex shapes of harder-to-work alloys. In each instance, Hydroforming substantially reduced the number of operations required to form the part conventionally . . . used simple tooling, costing from 25% to 90% less than conventional tools . . . and produced a part of higher quality.

These advantages—better parts, in fewer operations, at lower costs—can be yours by Hydroforming. Let a Process Machinery Division field engineer give you full details. For a description of the process and specifications of the six machine sizes, write for Bulletin M-1908.




**CINCINNATI 8" HYDROFORM**
Also built in 12", 19", 23", 26" and 32" sizes.



**1 OPERATION**—.030" Brass. Automotive detail.

**1 OPERATION**—.034" CRS, deep-drawing quality. Previous forming method required drawing the can, cutting a slot in the wall and welding on the protruding section.

CINCINNATI **Hydroform**

PROCESS MACHINERY DIVISION

**THE CINCINNATI MILLING MACHINE CO.**

**CINCINNATI 9, OHIO, U. S. A.**

An important cog in this nation's defense is this Air Force jet fighter, the F101A "Voodoo." By using laminated epoxy tooling, McDonnell Aircraft Corporation, its manufacturer, has reduced cost and speeded production of aircraft and helicopter components, some of which are incorporated in this plane. The epoxy plastic tooling compounds that are used are a product of **Ren Plastics, Inc.**, P.O. Box No. 1256, Lansing 4, Mich.

***Compounds based on BAKELITE Epoxy Resins***

# cut production costs, tooling time

Faster, less costly production of interchangeable aircraft components results from the advantages of "Ren" plastic tooling compounds based on BAKELITE Brand Epoxy Resins. For instance:

- Overall savings as high as 40 per cent have resulted where tools are adaptable to plastic.
- Weight of plastic tools is only 25 per cent that of similar steel or kirksite tools, 60 per cent that of aluminum tools.
- Savings in tooling-up time are as much as 40 per cent when compared with conventional tooling materials.
- Up to 75 per cent of all the interchangeable door panels used in one aircraft have been assembled and coordinated with tools made of BAKELITE Epoxy Resin—glass cloth laminates.

BAKELITE BRAND EPOXY RESINS

**BAKELITE COMPANY,** *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N. Y.

The term BAKELITE and the Trefoil Symbol are registered trade-marks of UCC

# Clark Controller's Jung: Forecaster

"A FLOW of new products is necessary for the sound growth of a firm in today's expanding economy," believes E. R. Jung, vice president, Clark Controller Co., Cleveland.

Mr. Jung is a metalworking executive representative of a new slant in management thinking. (Titles like his—vice president, marketing—are relatively new in industry.)

**Reorganization**—Says Mr. Jung: "My job is to plan and develop ways and means of increasing my company's business. I co-ordinate the activities of the sales department, new product division, renewal parts division, applied engineering department and advertising and sales promotion."

Clark Controller, a producer of general purpose and heavy duty electric motor controls, reorganized along those lines the first of the year. A supplier for the metalworking industry, it is closely identified with the problems of automation.

**Separate but Integrated**—The crux of the new policy is the placement of the new product division. Physically, and in spirit, it's separated from day to day plant activities.

"The danger," reports Mr. Jung, "is that a man puts aside his new product work for current work. Before the reorganization, new product development was not getting all the time it needed."

The various divisions headed by him also have separate accounting systems. It's up to Mr. Jung to integrate their activities.

**Data and Guesses**—From statistical data supplied by a trade association, he projects the apparatus needs of many industries and relates those needs to Clark Controller's business by product and region. A good guess is sometimes required, too.

Competition in his industry is "healthy," says Mr. Jung. He's confident about the future, and reports that Clark Controller's sales for the first half will be up substantially from last year's first half.

"Modest plant expansions have already been made this year, and others are contemplated if the present trend continues."

Mr. Jung is the father of 17-year-old twins (a boy and girl). He is 53, and admits to a number one hobby, but adds: "I'm a terrible golfer."

# Teamwork Along the Ohio

**It has sparked a boom which has brought $5.3 billion in new plants and $2.4 billion in facility expansions to the Valley since Jan. 1, 1950. Six states benefited**

CO-OPERATION between business leaders of six Ohio valley states is fashioning a new industrial region from a string of unco-ordinated "mill towns."

The stream once divided states. Desire for industrial expansion now unifies them. As Walter L. Myers Jr., executive manager, Upper Ohio Valley Development Council Inc., Steubenville, O., explains: "Several earnest efforts to attract more industry to the Ohio valley have failed because they were on a local scale. Our group cuts across state lines, including counties in West Virginia and Ohio, with the common interest of bringing industry here."

**Joint Efforts**—The Ohio Valley Improvement Association, Cincinnati, numbers among its more than 100 members representatives of industry, banking interests, department stores and civic groups. It aids industries serving the valley or shipping products on the river.

All sections are participating in the boom which (since Jan. 1, 1950) has brought $5.3 billion in new plants and $2.4 billion in plant expansions to the Ohio river valleys of Illinois, Indiana, Kentucky, Ohio, Pennsylvania and West Virginia. The valley offers industry a stable labor force, water, power, excellent industrial sites and sources of raw materials.

**Growth of Metals**—Look at metalworking statistics, and you'll discover metals are beating a path to the Ohio river. The Aluminum Association, New York, reports aluminum ingot capacity on Jan. 1, 1956, was about 1.7 million tons annually. Three new plants, planned for the Ohio valley, will add 430,000 tons to that total.

On June 1, the Aluminum Co. of America started construction of a 150,000-ton primary smelter near Evansville, Ind. Kaiser Aluminum & Chemical Co. announced it will build a reduction plant with an annual capacity of 220,000 tons at Ravenswood, W. Va. Olin Mathieson Chemical Corp. will build a fully integrated primary aluminum plant at Clarington, O., to furnish 60,000 tons of aluminum. Producers say low-cost coal power and proximity to principal markets attract them to the Ohio valley.

**Steel Suppliers**—New ferroalloy capacity is moving in. Most of this expansion is drawn by steel and aluminum growth in the area. In May, Pittsburgh Coke & Chemical Co. formed Neville Ferro Alloy Co., a wholly owned subsidiary, to produce ferromanganese and other ferroalloys at Neville Island, Pa. Customers will include expanding steel mills.

In 1949, Pittsburgh Metallurgical Co. had three electric furnaces at Calvert City, Ky., a production point for ferrochromium and ferrosilicon. The firm now has ten furnaces at Calvert City, with additional capacity under construction. Vanadium Corp. of America will build a plant near New Alexandria, O., to make ferrochromium. Electric furnace facilities will produce other ferroalloys used in steel and aluminum production.

**Zirconium**—"We will build a multimillion-dollar plant for the production of zirconium, structural material used in atomic reactors," announces Carborundum Metals Co. Inc., a subsidiary of Carborun-

## Total Expansion Since Jan. 1, 1950*

(In millions of dollars)

| | NEW PLANTS | PLANT EXPANSION | TOTAL |
|---|---|---|---|
| Illinois | $197 | $ — | $197 |
| Indiana | 303 | 7 | 310 |
| Kentucky | 1,733 | 843 | 2,576 |
| Ohio | 2,154 | 395 | 2,549 |
| Pennsylvania | 366 | 739 | 1,105 |
| West Virginia | 526 | 448 | 974 |

*Excludes public works and schools

Source: Ohio Valley Improvement Association

dum Co. Joint efforts by several civic and industrial groups helped the valley secure this plant (it's at Parkersburg, W. Va.).

Steel expansion in the valley keeps pace with nonferrous metals. Cincinnati, Wheeling, W. Va., and Pittsburgh district plants have capacity of 33.5 million tons a year, or 26 per cent of American steelmaking potential. In plans announced early this year, Pittsburgh mills reported they would add 1.2 million tons of capacity. Cincinnati firms planned increases of 790,000 tons, and Wheeling firms expected to add 620,000 tons to capacity.

**Growing Firms**—Detroit Steel Corp. will spend $20 million on capital improvements at its Portsmouth, O., works this year and next. This program includes a new sintering plant and a 275-ton open-hearth furnace.

Jones & Laughlin Steel Corp. will add two oxygen converters to its Aliquippa, Pa., plant. Weirton Steel Co. is building a new open hearth at Weirton, W. Va., and Armco Steel Corp. will add three open hearths at Middletown, O. Crucible Steel Co. of America plans to increase capacity at Midland, Pa., by 72,000 tons this year.

**More Expansion**—A $65-million expansion move by Wheeling Steel Corp. will add about 270,000 tons to its capacity at Steubenville, O. Pittsburgh Steel Co. and U. S. Steel Corp. will add to Monongahela valley plants near Pittsburgh.

In some districts, growth of metalworking has not matched increases in basic metal production, but in areas of aggressive civic cooperation with industry, new fabricators are attracted to the valley. In Louisville, manufacturing employment leaped from 33,426 in 1939 to 81,343 in 1953, the Chamber of Commerce reports. Machinery workers increased from 2447 in 1939 to 15,996 in 1953. Employment in other metalworking categories doubled.

**Small Town Growth**—The impact of new industry on a small community is illustrated by Paducah, Ky. That city had 33,000 citizens in 1950. Since then, nine firms have built or expanded plants in the area, adding more than 3400 new jobs.

Dravo Corp., Pittsburgh, will agree that industrial expansion begets more industry. The firm is building 10 to 15 docks per year for industries moving into the valley. About 4000 tons of sheet piling per year go into them. In 1955, Dravo built 112 barges and six towboats for service on all inland waterways.

**Traffic Squeeze**—With power and chemical expansions in the Ohio valley matching metalworking's growth, it's not surprising that the river is busier than a freeway at rush hour. An Armco Steel Corp. spokesman explains: "We use the Ohio to move pig iron by barge from Cincinnati to our Butler, Pa., plant. We move about 1.5 million tons of coal a year from Huntington, W. Va., to Cincinnati. Transportation is delayed by outmoded and deteriorating locks, increasing our costs."

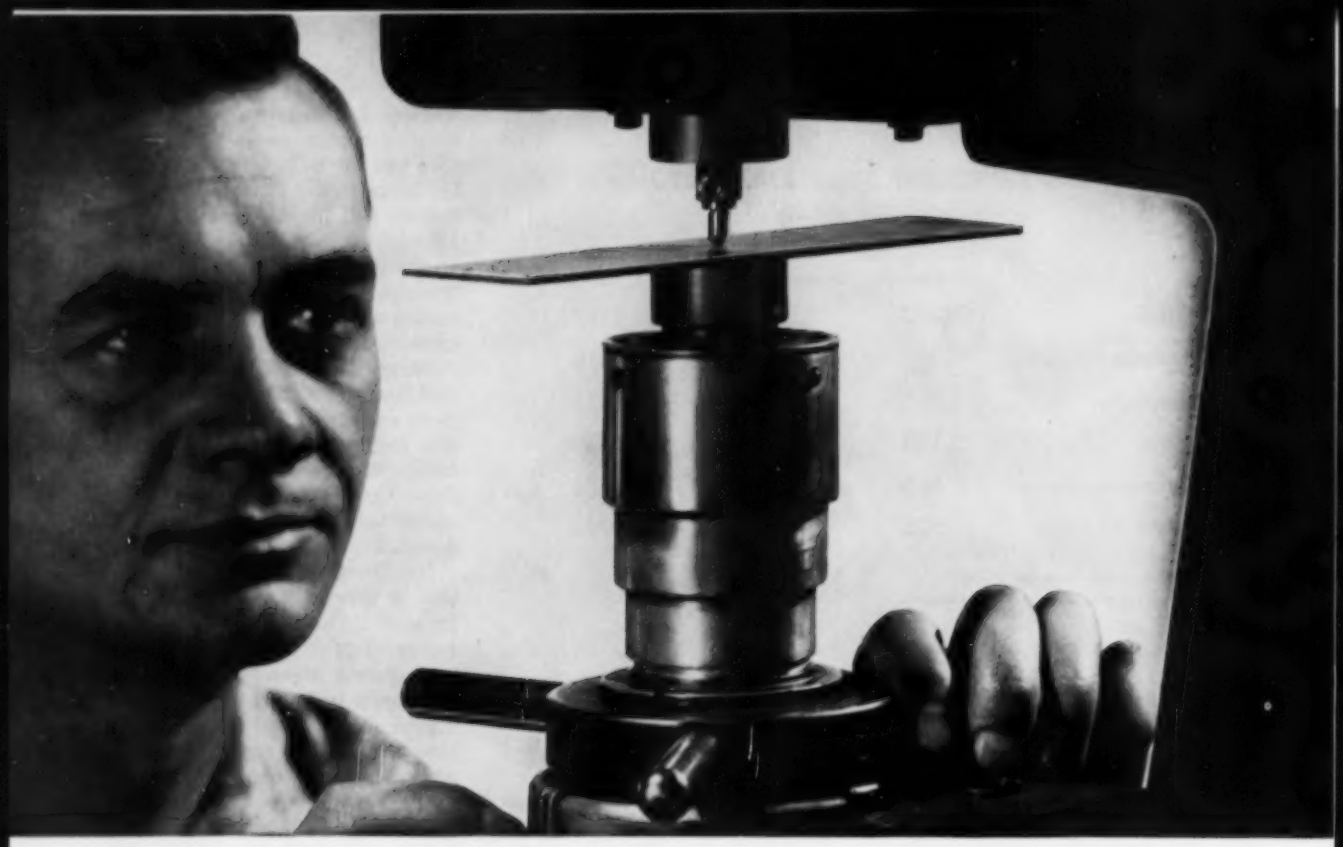
Barges carried 7 million tons of coal on the Ohio in 1925 when locks and dams were new. In 1953, coal shipments totaled 31.7 million tons. Expansion of aluminum, power and atomic energy plants guarantees further growth in coal demand.

**Deadline**—River engineers admit that a lock at Louisville will not be able to handle any increase in barge traffic after 1960. Industrial growth depending on coal will eventually be halted between Huntington, W. Va., and Louisville, unless a complete program of lock and dam improvement is started soon.

Political boundaries have delayed the district's growth. The growing spirit of unification, which has already helped to solve problems along the banks of the Ohio, may bring improvements to the river, too.

**Better Transportation** — New highways are being planned to bypass river cities and connect industrial sites with inland cities. Groups from neighboring states are discussing such common interests as flood control. Further improvements include the Pennsylvania Railroad's $34 million "push-button" freight classification yard at Conway, Pa. All east-west freight moving over the railroad will pass through the yard at a saving of as much as 24 hours per car. The Pennsylvania is also building a 12-mile extension of its line to serve the new Olin Mathieson aluminum plant.

Industrialists are urging the government to deepen the river's 9 ft channel to 12 ft. Shippers want the U. S. Army's Corps of Engineers to build 16 new locks and modernize five others. They say these 21 modern locks could replace 46 older ones. The larger pools created by new dams would be potential sites. A big program is necessary, say many manufacturers, to keep the turbulent Ohio rolling smoothly in the future.



# How Great Lakes Steel *puts the pressure* on quality

COILS ARE ANNEALED in these giant ovens to impart maximum softness and ductility. And then . . .

COILS ARE TEMPER ROLLED in a skin mill to give the stiffness, surface and flatness which have been specified by the customer for the order.

Right on the nose—not too hard, not too soft! This steel coil passes the Rockwell Test with tolerance to spare.

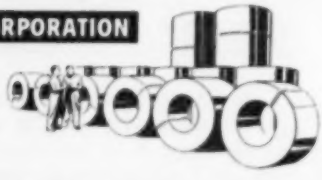
In the Rockwell, or hardness test, pressure is put on a sample piece of coil by a system of loads applied through a tiny ball. A needle gauge signals the depth of the impression. From this, our test engineers can readily tell: (1) if the coil was annealed to maximum softness for extra-deep drawing; and (2) if it is now properly tempered to meet customer specifications.

Quality control every step of the way—yes, that's our most important job at Great Lakes. Reason enough to call us and talk over your steel needs?

**GREAT LAKES STEEL CORPORATION**

Ecorse, Detroit 29, Michigan • A Unit of

**NATIONAL STEEL CORPORATION**



*District Sales Offices:* Boston, Chicago, Cincinnati, Cleveland, Grand Rapids, Houston, Indianapolis, Lansing, Los Angeles, New York City, Philadelphia, Pittsburgh, Rochester, St. Louis, San Francisco, Toledo, Toronto.

*Blowout-proof tires may make spares obsolete, so . . .*

# Auto Stylists Eye New Tire

ELIMINATION of spare tires has been a long standing dream of auto stylists and designers. They're interested in the blowout-proof tire announced by Goodyear Tire & Rubber Co., Akron.

Walter Lee, director of tire development for Goodyear, claims a driver can run more than 100 miles on the tire after a blowout. This means, says Mr. Lee: "There will be a gradual change-over . . . but with our new assembly, I feel the no-spare-tire era is not far away."

**Support**—A Fisher Body designer adds: "Most persons are conditioned to having a spare. It will take some time to convince them it isn't necessary."

When the change does come, stylists will be pushing it. Getting rid of the spare will give them more leeway in changing the aft appearance of cars. It also will make for increased trunkroom, which designers want for air conditioning units and back seat TV sets.

**Trend**—Ford Thunderbirds went back to the old system of placing the spare outside the trunk. The Continental Mark II has its rear trunk deck around the spare tire well.

But before carbuilders can scrap the spare completely, they'll have to be sure the other four tires can carry the load. Tire failures account for too many service calls to warrant taking any chances (see table).

**Structure**—Goodyear feels it has the answer in its Captive-Air tire. Basically, it is a tire within a tire. A 2-ply tire that looks like an inner tube is fitted inside a standard outer tire. Goodyear engineers find nylon cord works better than rayon for bolstering both inner and outer units.

The inner tire is inflated through a regular valve in the wheel rim. The outer tire is equipped with a self-sealing valve in the sidewall. A needle is inserted into the valve, and the outer tire inflated the same way a football is blown up. The needle is kept in the glove compartment. It fits air chucks at service stations.

**Separate**—The important difference between this tire and former tubeless and self-sealing models is

**1955**
**AAA Road Service Report**
(in per cent)

| | |
|---|---|
| Tires | 24.9 |
| Battery & electrical | 24.0 |
| Ignition | 12.7 |
| Tow | 6.5 |
| Stuck | 4.9 |
| Wrecker | 4.2 |
| Starter | 3.8 |
| Out of gas | 3.8 |
| Carburetor | 2.9 |
| Lock & key | 1.5 |
| Gasoline | 1.9 |
| Brakes | 1.0 |
| Lights | 1.1 |
| Other | 6.8 |
| | 100.0 |

Based on 50.1 million emergencies reported to AAA

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that each section contains its own air. When the outer tire is punctured, captive air in the inner chamber supports the tire. The deflated outer casing still protects it from bumps and bruises.

This means that if a tire is punctured, the driver can continue to the nearest gas station, or even to his home, before stopping for repairs. Today's tubeless tires only give a driver 5 or 10 seconds to get the car off the road.

A test drive indicates that cars still handle easily when the outer tire is deflated. There is no loss of control. Handling is a bit more sluggish, particularly without power steering, but at speeds above 40 mph, it's hardly noticeable.

**Appearance** — Captive-Air tires are going on the accessory market now, but it may be some time before they're standard or optional equipment on new cars. "There's a possibility the tire will be used on some '57 cars to be introduced this summer," says Mr. Lee. Carbuilders aren't that optimistic.

Chrysler says the tire has definite possibilities, but won't commit itself beyond that. American Motors Corp. spokesmen suggest that if the tires should appear this year, they probably will be optional on high priced models. A Ford stylist thinks they might show up on Thunderbirds.

Goodyear admits it doesn't have facilities to turn out enough tires for original equipment and replacement markets. It seems logical to look for them on some of the lower volume 1958 models which aren't getting a major change this year.

**Cost**—Price is another determinant as far as car companies are concerned. Victor Holt Jr., Goodyear's sales vice president, reports: "List price for the Captive-Air tire, not including trade-in allowances or taxes, will be roughly about $60."

While this is some 20 per cent more than most top grade nylon cord tires, total cost of four Captive-Air tires may be about equal to five premium priced tubeless tires.

**Problems**—Mr. Lee admits the tires are not 100 per cent blowout-proof. It is possible that a second puncture in the same tire after the outer tire is deflated will result in a flat.

The tires have run more than 4 million test miles on taxicab fleets. Sixteen cases of outer tire deflation were reported. In only one case was the inner tire also ruptured. The 15 other drivers delivered passengers and returned to home garages for repairs.

## Dodge Looks to Future

A production rate of 8 million cars a year won't be unusual by 1960, thinks William C. Newberg, president, Dodge division, Chrysler Corp., Detroit.

Mr. Newberg says last year's record sales were the first clear tipoff on the potential demand for cars in this country. He adds: "A 10 million annual car market is likely by 1965 or shortly thereafter."

Although some economists have called 1955 an abnormal year for car sales, Mr. Newberg points to a growing population rate of 3 million persons a year and the trend to suburban living as major factors in boosting demand.

"Recent studies show that between August, 1953, and August, 1955, the number of multiple-car families grew from 3.5 million to over 6 million. That's an increase of more than 70 per cent in two years," he adds. Mr. Newberg predicts the scrappage rate for worn-out cars will increase to somewhere around 5 million by 1965.

While looking at the future, Mr. Newberg did not discuss this year's sales slump. Reports from the Big Three show that total Chrysler Corp. production for the first five months of this year was 448,887 units, compared with 714,639 cars and trucks in the same period last year.

Ford Motor Co. produced a five-month total of 876,196 units, compared with 1.1 million last year.

General Motors Corp.'s truck and passenger car production through May was 1.7 million, compared with 2 million last year in the same period. GM totals are U. S. production figures only.

### U. S. Auto Output

Passenger Only

| | 1956 | 1955 |
|---|---|---|
| January | 612,079 | 659,508 |
| February | 555,689 | 674,951 |
| March | 575,530 | 792,436 |
| April | 547,766 | 752,245 |
| May | 471,994† | 723,868 |
| 5 Mo. Total | 2,763,058† | 3,603,008 |
| June | | 648,412 |
| July | | 658,696 |
| August | | 613,705 |
| September | | 460,443 |
| October | | 517,788 |
| November | | 749,061 |
| December | | 682,256 |
| Total | | 7,933,369 |

| Week Ended | 1956 | 1955 |
|---|---|---|
| May 12 | 105,654 | 177,287 |
| May 19 | 105,869 | 176,441 |
| May 26 | 108,230 | 167,555 |
| June 2 | 77,451 | 125,018 |
| June 9 | 105,320† | 134,673 |
| June 16 | 105,000* | 139,743 |

Source: *Ward's Automotive Reports*
†Preliminary *Estimated by STEEL

## Exhaust Notes

- Studebaker-Packard Corp. has been awarded a $1-million Air Force contract to tool up for production of components for J-57 jet engines. The company received a similar $1.4-million contract last February. This may move S-P closer to a merger with Curtiss-Wright.
- Robert F. Black, chairman of White Motor Co., Cleveland, predicts company sales in excess of $200 million this year. Sales in 1955 totaled $179.9 million. Net income should be about $6.5 million, compared with $6 million last year.
- Rumor has it that Pontiac is working on a water pressure, fuel injection system which it hopes will be ready by 1958. For 1957, Pontiac supposedly is making a larger draw on its rear quarter panels, leaving less work on the rear panel extension. Ultimate aim: Turn out quarter panel and rear panel extensions as one piece.
- States *Ward's Automotive Reports*: New car dealers closed out May with the highest daily selling rate of the year. Retail deliveries from May 21 to 31 were almost 11 per cent above the previous 10-day period. Dealer inventories are now guessed to be around 40 days' supply, down 70,000 units from April.

PRODUCTION SHORT CUTS WITH

# ZINC DIE CASTINGS

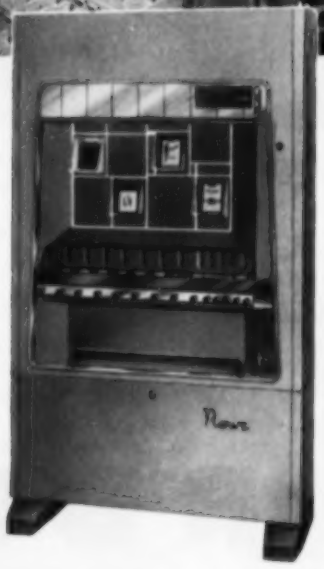
NUMBER 3 OF A SERIES

## MAKING THE SALE FOR . . . . Rowe®

When you make a purchase from the familiar Rowe Ambassador cigarette machine, the coins are handled almost completely by a series of intricately shaped ZINC Die Castings. A die cast plunger then delivers the package you select. The efficiency with which this mechanical business transaction takes place is the result of expert engineering which has made Rowe "America's First Automatic Merchandising Family."

These are the outstanding production advantages provided by the use of ZINC Die Castings for the vital cigarette machine components:

1. Avoidance of expensive machining—the castings are virtually ready for assembly as received from the die caster.
2. Minimizing of assembly operations—unusual complexity of shape makes one part serve in place of several if produced by other means.
3. Assurance of trouble-free operation through sturdy construction and close dimensional control of all castings in long production runs.
4. Ability to take and hold economical and attractive plated coatings (external castings only, internal parts are used "as is").



The continuous use of ZINC Die Castings by Rowe Manufacturing Company, Inc. through many machine design improvements, over a long period of years, is a tribute to the fine performance of such parts under rough everyday operation. For possible answers to *your* production problems through the use of ZINC Die Castings, send for our brochure and contact any commercial die casting company.

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HERE'S wire rod squeezing through a succession of drawing dies at RB&W. Why draw wire when it can be purchased in standard dimensions? Because it's a form of quality control that helps make better fasteners.

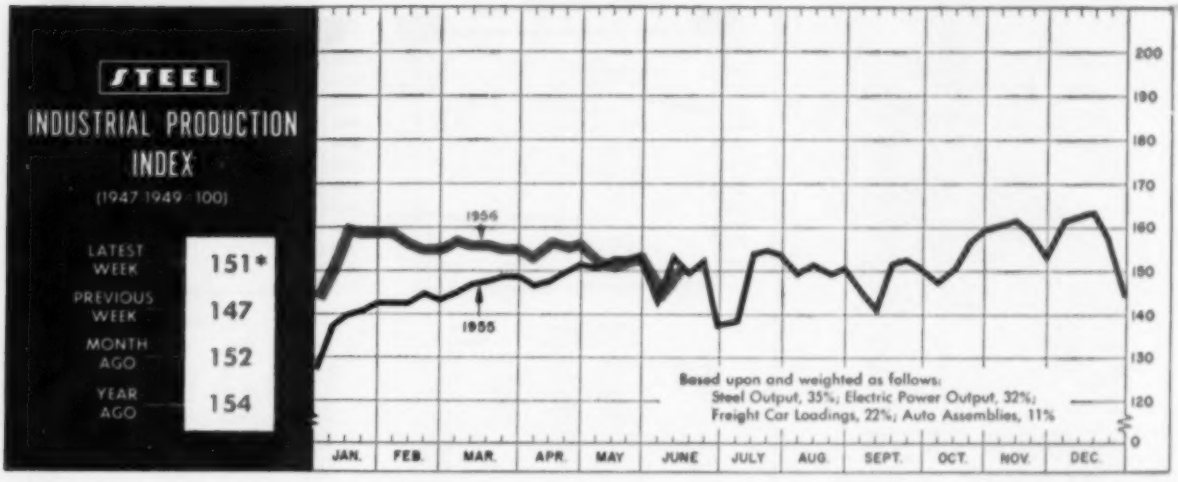
RB&W has a whole battery of machines to handle round and rectangular stock, even up through 1-inch size. Above you see Dominick DeCarlo keeping a keen eye on rod destined to become cold upset bolts. He's typical of many RB&W people . . . been with the company over 15 years.

He's doing a job that more accurately sizes the material . . . strengthens it . . . assures its uniformity . . . permits control of the coating used and, therefore, of the finish obtained.

It's this combination of facilities, experience and quality control in action in every RB&W plant that assures you more fastener quality for your money . . . a reliable source of supply . . . and strong fasteners that never let you down.

Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N.Y.

**Plants at:** Port Chester, N. Y., Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver; Seattle. **Distributors** from coast to coast.




*Week ended June 9

# Summer Employment Heads for New High

THIS SUMMER will see a paradox within the nation's labor force: Record employment, accompanied by rising unemployment in what is expected to be the "off" quarter of the year.

The civilian labor force, now at about 67.5 million, will probably reach its peak in August, which is a normal seasonal development. At that time, it should be somewhat over 69 million, a new record. The increase is explained largely by the influx of high school and college students who seek summer employment. Most of the gain will be absorbed in seasonal work, which will raise the employment figures to a record of over 66 million. (The record, set last October, stands at 65.5 million.)

**Nonseasonal**—This will result in an uptrend in unemployment, which is counter to the normal seasonal pattern. The figure should top 3 million for the first time since March, 1955.

The important figure as far as the general economy is concerned is the 66 million employed. They will go into service work and some outdoor activities such as construction and agriculture. Few will go into the factories, which will be holding over-all employment fairly even throughout the third quarter. The earnings of these extra workers may be an important factor in softening what seems to be an inevitable third quarter cutback.

**Balance**—Without this "cushion," personal income—now at a record annual rate of $317.1 billion—would almost surely fall this summer. Vacations will cut in, and even though most workers enjoy paid leisure, they don't earn any overtime while they're fishing or playing golf. In addition, there will be noticeable cutbacks in many consumer durable goods factories. Some of the cutback will be in layoffs, but the biggest part will come in shorter hours. Even though many producers of capital goods will be going full force (see page 101) this will not counterbalance reductions elsewhere. So the sum-

## BAROMETERS OF BUSINESS

| | LATEST PERIOD* | PRIOR WEEK | YEAR AGO |
|---|---|---|---|
| **INDUSTRY** | | | |
| Steel Ingot Production (1000 net tons)[2] | 2,378[1] | 2,380 | 2,316 |
| Electric Power Distributed (million kw-hr) | 10,850[1] | 10,598 | 10,041 |
| Bituminous Coal Output (1000 tons) | 8,845[1] | 10,120 | 8,669 |
| Petroleum Production (daily avg—1000 bbl) | 7,037[1] | 7,071 | 6,600 |
| Construction Volume (*ENR*—millions) | $250.2 | $562.6 | $378.3 |
| Auto, Truck Output, U. S., Canada (*Ward's*) | 140,850[1] | 108,270 | 172,794 |
| **TRADE** | | | |
| Freight Car Loadings (1000 cars) | 775[1] | 719 | 787 |
| Business Failures (Dun & Bradstreet) | 255[1] | 238 | 230 |
| Currency in Circulation (millions)[3] | $30,505 | $30,327 | $30,059 |
| Dept. Store Sales (changes from year ago)[3] | +7% | +3% | +5% |
| **FINANCE** | | | |
| Bank Clearings (Dun & Bradstreet, millions) | $22,471 | $18,295 | $19,603 |
| Federal Gross Debt (billions) | $276.7 | $275.8 | $277.5 |
| Bond Volume, NYSE (millions) | $21.1 | $15.2 | $25.7 |
| Stocks Sales, NYSE (thousands of shares) | 9,882 | 8,679 | 14,512 |
| Loans and Investments (billions)[4] | $84.7 | $85.1 | $84.2 |
| U. S. Govt. Obligations Held (billions)[4] | $26.9 | $26.9 | $33.0 |
| **PRICES** | | | |
| STEEL's Finished Steel Price Index[5] | 210.45 | 210.45 | 194.53 |
| STEEL's Nonferrous Metal Price Index[6] | 275.5 | 275.3 | 237.4 |
| All Commodities[7] | 114.2 | 114.3 | 110.3 |
| Commodities Other Than Farm & Foods[7] | 121.5 | 121.6 | 115.5 |

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1956, 2,461,893; 1955, 2,413,278. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100

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Steeletts bring to industry a new grit with all the advantages of high carbon steel to rewrite the story of GRIT blasting costs. For the first time, hardness has been combined with toughness in a single grit to provide maximum efficiency at the lowest possible cost.

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*For complete information on Steeletts, send for Bulletin 901-D.*

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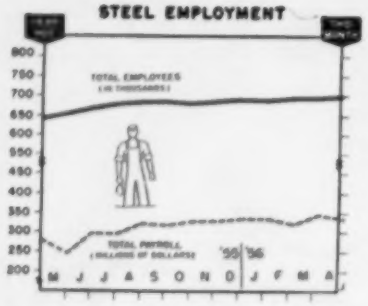
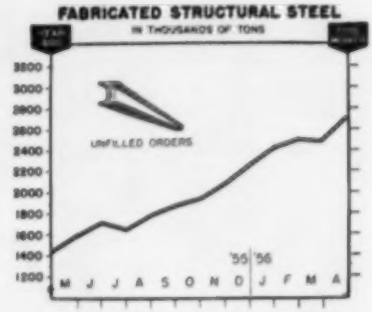
## THE BUSINESS TREND




| | Employment in Thousands | | Payroll in Millions | |
|---|---|---|---|---|
| | 1956 | 1955 | 1956 | 1955 |
| Jan. | 681 | 605 | $329.1 | $258.8 |
| Feb. | 684 | 616 | 317.3 | 255.1 |
| Mar. | 685 | 630 | 338.1 | 288.2 |
| Apr. | 688 | 643 | 326.7 | 282.0 |
| May | .... | 654 | .... | 249.1 |
| June | .... | 667 | .... | 298.4 |
| July | .... | 676 | .... | 296.8 |
| Aug. | .... | 680 | .... | 320.7 |
| Sept. | .... | 680 | .... | 317.1 |
| Oct. | .... | 678 | .... | 325.1 |
| Nov. | .... | 680 | .... | 326.1 |
| Dec. | .... | 682 | .... | 330.6 |

American Iron & Steel Institute




| | Shipments | | Backlogs | |
|---|---|---|---|---|
| | 1956 | 1955 | 1956 | 1955 |
| Jan. | 251.5 | 225.8 | 2,408 | 1,346 |
| Feb. | 285.4 | 213.4 | 2,476 | 1,360 |
| Mar. | 306.8 | 227.8 | 2,463 | 1,392 |
| Apr. | 289.6 | 239.7 | 2,687 | 1,444 |
| May | .... | 223.2 | .... | 1,592 |
| June | .... | 282.3 | .... | 1,706 |
| July | .... | 219.4 | .... | 1,639 |
| Aug. | .... | 268.0 | .... | 1,776 |
| Sept. | .... | 289.1 | .... | 1,854 |
| Oct. | .... | 283.8 | .... | 1,928 |
| Nov. | .... | 258.9 | .... | 2,075 |
| Dec. | .... | 248.0 | .... | 2,243 |
| Total | .... | 2,979.4 | | |

American Institute of Steel Construction

Charts copyrighted, 1956, STEEL

mer worker assumes a key role in keeping the economy in near balance.

The big factor which could throw the whole picture out of focus would be a prolonged steel strike. Faced with the prospect of a substantial loss in income, many steelworkers would look elsewhere for temporary jobs to fill the gap. In addition, consumers caught without sufficient inventories of steel would be forced to slow down or close down, pouring more workers into the summer labor market.

**Don't Worry** — The unemployment figure should not bother anybody too much: It is artificially high. It does not mean that labor will be a drug on the market, except in such hard-hit spots as Detroit and other auto making centers. When autumn comes, there will be a sharp reduction of unemployment as many students return to school and the auto industry gets set for its new model push.

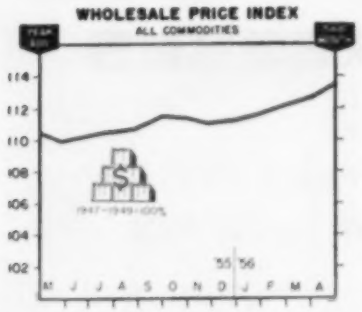
## Steel's Influence To Slip

The steel industry has been one of the strongest factors in the employment picture this year (see chart above). Mills are scheduled to operate at about 96.5 per cent of capacity from now until July 1, but it is doubtful that the rate can be maintained. This is the season for wildcat strikes.

If there is no major strike next month, steel mills likely will cut back gradually to about 85 per cent of capacity in the third quarter, reducing hours and employment along the way. If there is a strike of any considerable length, metalworking companies will work off inventories during the shutdown. In either case, the fourth quarter should see steel mill employment come back to about the current record level.

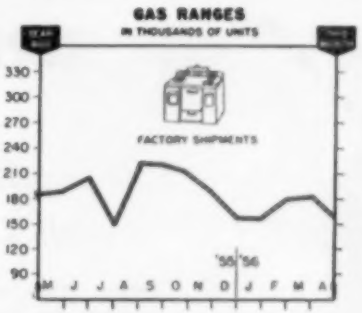
## Where Does the Money Go?

Translated into dollars and cents, this full employment means more money in the hands of the consumers. They can do three things with it: Buy, save or pay off debts. They seem to be concentrating on paying off debts. Consumer installment credit is still rising, but not at the rapid pace of late 1955. It was about $28.3 billion at the beginning of May. The slowdown comes not only as the result of repayment of debts but also from a hangover from the buying splurge last year. It is becom-




| | 1956 | 1955 | 1954 |
|---|---|---|---|
| Jan. | 111.9 | 110.1 | 110.9 |
| Feb. | 112.4 | 110.4 | 110.5 |
| Mar. | 112.8 | 110.0 | 110.5 |
| Apr. | 113.7* | 110.5 | 111.0 |
| May | .... | 109.9 | 110.9 |
| June | .... | 110.3 | 110.0 |
| July | .... | 110.5 | 110.4 |
| Aug. | .... | 110.9 | 110.5 |
| Sept. | .... | 111.7 | 110.0 |
| Oct. | .... | 111.6 | 109.7 |
| Nov. | .... | 111.2 | 110.0 |
| Dec. | .... | 111.4 | 109.5 |

U. S. Bureau of Labor Statistics
*Preliminary




| | Shipments—Units 1956 | 1955 | 1954 |
|---|---|---|---|
| Jan. | 153,500 | 153,400 | 137,000 |
| Feb. | 178,400 | 186,500 | 152,900 |
| Mar. | 181,500 | 218,100 | 188,200 |
| Apr. | 156,400* | 183,200 | 172,400 |
| May | ..... | 187,700 | 163,800 |
| June | ..... | 204,000 | 174,300 |
| July | ..... | 146,300 | 134,500 |
| Aug. | ..... | 220,000 | 179,400 |
| Sept. | ..... | 219,100 | 203,900 |
| Oct. | ..... | 210,300 | 197,100 |
| Nov. | ..... | 184,400 | 174,000 |
| Dec. | ..... | 153,600 | 147,300 |
| Total | ..... | 2,266,600 | 2,024,800 |

*Preliminary
Gas Appliance Mfrs. Assn.

ing more and more obvious that consumers overbought then, especially autos and appliances. There is some added saving, too, but bankers feel it is less than income figures would indicate it should be.

## FRB Index May Dip to 135

Just how far will production slip in the third quarter? One economist told STEEL that the Federal Reserve Board's industrial production index may slide to 137 (1947-1949=100). "And I wouldn't be a bit surprised to see it go clear to 135, but then it will come back up to around the first-quarter level (about 142 or 143) before December. I can remember in 1953 and 1955 when the index was going up to that level, everybody thought that was pretty good," he added.

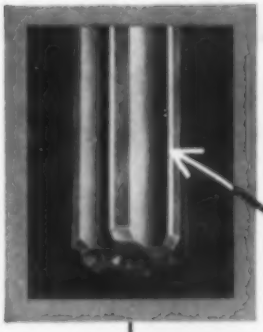
## Trend Line Recovers

STEEL's industrial production index bounced back above the 150 mark after the Memorial Day week as it registered a preliminary 151 (1947-1949=100) for the week ended June 9. That's at least 2 percentage points below what it would be if it weren't for the strike at U. S. Steel Corp.'s Tennessee Coal & Iron Division in Birmingham. Prospects are practically nil for a settlement of that dispute before the final settlement of overall steel industry negotiations. So the chances of the index rising much higher before the fourth quarter are slim. To see what influence a steelworkers' strike has on the index, see page 97.

The weakest segment of the index is still automotive. Sales are encouraging, but the upsurge came too late to help '56 model production.

## Fabricators See Good Year

Fabricators of structural steel are anticipating record bookings of about 4 million tons this year. That will top the 1955 high of 3.7 million tons, and shipments will show a corresponding increase. The backlog of 2,687,256 tons, also a new high (see chart, page 116), probably will increase even more before new structural steel capacity permits monthly shipments to balance out new orders. Already there are indications that an easing is setting in for structurals. But the peak in supply probably will not be reached until late in the fourth quarter (see STEEL, June 4, p. 157).

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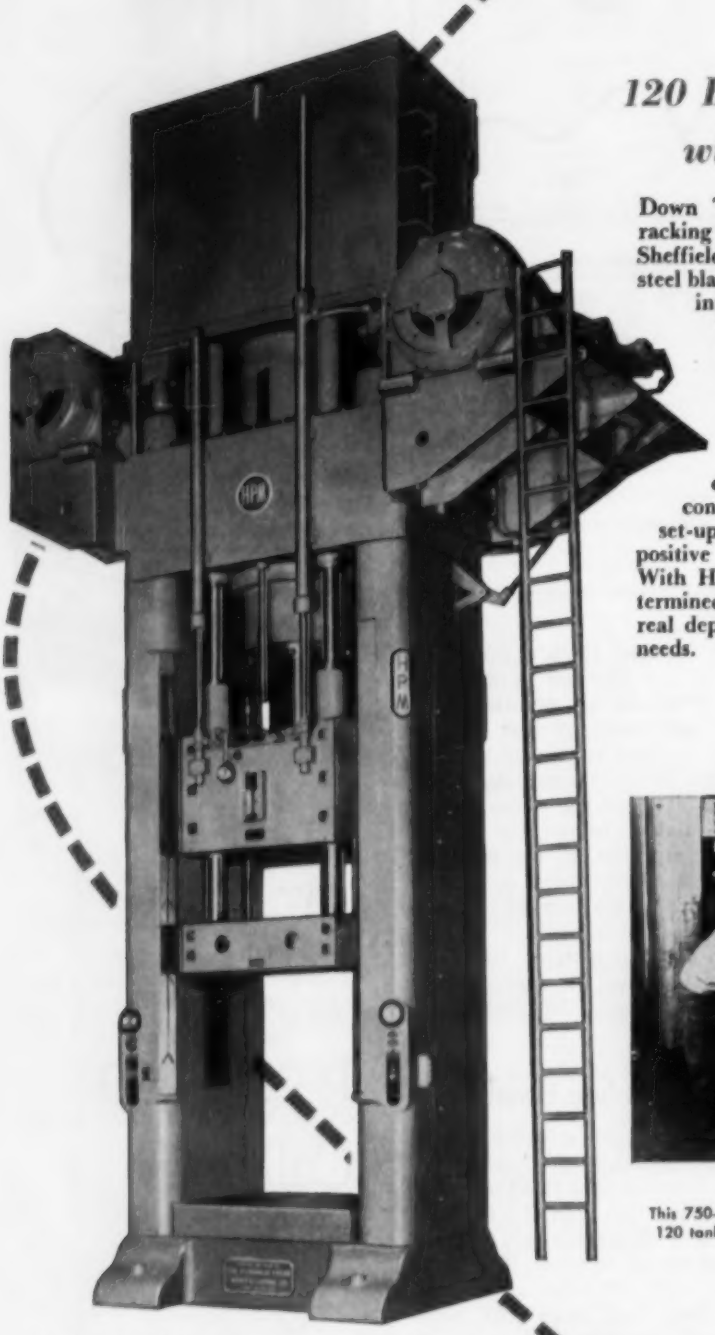
# BIG THINGS WITH H-P-M PRESSES



## *120 Big Draws Every Hour with 750-Ton H-P-M*

Down Texas way, this big 750-ton H-P-M is racking up impressive production figures for Sheffield Steel Corporation of Houston. The .210" steel blanks, 39" in diameter, are fed automatically into the press and drawn to a depth of 10". The finished tank heads are 30" in diameter; later welded to tank cylinders for gas storage use.

Here's why H-P-Ms really pay off for Sheffield . . . smooth fast drawing action without impact . . . fastraverse closed-circuit system for constant and controllable drawing speed . . . quicker die set-up . . . positive overload protection . . . positive blankholder pressure for entire draw. With H-P-Ms you have press reversal at predetermined pressure or position. Specify H-P-M for real dependability—for all of your metalworking needs. Write today for complete information.

This 750-Ton H-P-M with automatic feeding device turns out 120 tank heads an hour for the Sheffield Steel Corporation.

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METAL WORKING DIVISION

**THE HYDRAULIC PRESS MFG. CO.**

Mount Gilead, Ohio, U.S.A.

HPM

FRANK A. VOTTA JR.
. . . Hunter Spring chief eng.

JOHN A. LESCHEN
. . . Granite City Steel sales mgr.

MAXWELL D. MILLARD
. . . AS&W gen. sales manager

**Frank A. Votta Jr.** was made chief engineer, **Hunter Spring Co.**, Lansdale, Pa. He rejoins Hunter after two years with Philco Corp.

**Michael J. Hughes Jr.** was appointed chief metallurgist of the Seattle plant of **Bethlehem Pacific Coast Steel Corp.** He has served Bethlehem Pacific six years, four years in steel mill operations at the Seattle plant and the last two years in metallurgical contact service to customers.

**E. Sohier Welch** was made chief research engineer, **Fenwal Inc.**, Ashland, Mass. He joined the research department staff in 1950.

**Robert E. Drury** was elected vice president and assistant secretary, **Redmond Motor Co.**, Owosso, Mich. He continues as director of manufacturing.

**Topp Industries Inc.**, Los Angeles, named **Robert V. Higdon** and **John L. McLucas** vice presidents. Mr. Higdon is president and Mr. McLucas vice president of Haller, Raymond & Brown Inc., State College, Pa. The firm was recently acquired by Topp Industries.

**Robert K. Farrington** was elected president and general manager, **Thompson Electric Co.**, Cleveland. **Thayer B. Farrington** was made chairman and **George H. Page**, vice president-sales.

**John A. Leschen** was promoted to sales manager, **Granite City Steel Co.**, Granite City, Ill., and **Nicholas P. Cutlich** was made assistant sales manager. Mr. Leschen was assistant to J. L. Hamilton Jr., vice president-general sales manager.

**Donald C. Horsman** was made plant superintendent, **Continental Steel Corp.**, Kokomo, Ind.

**Salem Tool Co.**, Salem, O., appointed **J. H. Wilson Jr.** works manager; **George Adams**, chief engineer; **Vincent J. McCarthy**, sales manager; **Raymond Lowry**, plant superintendent; **Donald Thomas**, parts manager; and **Frank S. Painter**, purchasing agent.

**Philip R. Metzner** was elected vice president-general manager, **Charles Harley Co.**, San Francisco, to succeed the late **Dave Golub**.

**Gemmer Mfg. Co.**, Detroit, elected **William A. Blume** executive vice president and **E. D. Graham**, vice president.

**George A. Markell** was made assistant sales manager, **Elwell-Parker Electric Co.**, Cleveland. He was assistant to the sales manager.

**Crane Co.**, Chicago, appointed **Robert E. Penney** director of branches; **J. W. Greene**, director of industrial sales; and **W. A. Burbine**, director of heating sales.

**Maxwell D. Millard** was made general manager-sales, **American Steel & Wire Division**, U. S. Steel Corp., Cleveland. He succeeds **John Graham**, retired. Mr. Millard was formerly at Pittsburgh where he was director of distribution and availability in the corporation's commercial department.

**Charles V. Stevens** was made sales manager, **S. W. Card Mfg. Co.**, division of Union Twist Drill Co., Mansfield, Mass. He was with Stedfast & Roulston Inc., and formerly was southwestern sales manager with Kearney & Trecker Corp.

**Wales-Strippit Corp.**, North Tonawanda, N. Y., named **George N. MacFayden** purchasing agent to succeed **Clark A. Ralph** who will devote full time to a preventive maintenance program and planning for plant expansion.

At the Aurora, Ill., plant of **Caterpillar Tractor Co.**, **Harold M. Schafer** was made manufacturing manager; **William T. Gabbett**, purchasing agent; and **Louis G. Frank**, chief engineer.

In **Kaiser Aluminum & Chemical Corp.'s** new engineering department, Oakland, Calif., **B. S. Dalton** was named manager-raw materials engineering; **R. O. Gunderson**, manager-reduction engineering; and **David Mayers**, manager-fabricating engineering. **A. Dean Smith** was

J. H. ELLIOTT

E. H. GOTT

. . . executive posts at U. S. Steel

made manager-advanced engineering design and **Jean A. Hoffman**, manager-engineering planning.

**J. H. Elliott** was made assistant executive vice president-operations, **United States Steel Corp.**, Pittsburgh. He is succeeded as vice president-steel operations by **E. H. Gott. Oscar Pearson** succeeds Mr. Gott as general manager-operations. **A. J. Berdis** was made general superintendent, South Works, Chicago. **E. B. Speer** was made general superintendent, Fairless Works, Morrisville, Pa. Changes are effective July 1.

**Charles R. MacDonald** was named head of the new Chicago district sales office of **Palmer-Shile Co.**, located at 15 S. Austin Blvd. **Edward A. Baker Jr.** was added to the Detroit sales department.

**Harold F. Nunn** was named vice president, Canadian subsidiary, **Henry Disston & Sons Division**, H. K. Porter Company Inc., at Toronto, Ont.

**Wagner Electric Corp.**, St. Louis, consolidated its electrical and automotive engineering and research facilities under the direction of **P. C. Ford**, newly appointed executive engineer. **C. E. Widell** was made director of research and development and **P. J. Reese**, assistant director. In the electrical division, **H. B. Keath** was made chief product engineer-transformers; and **A. E. Frohardt**, chief product engineer-motors. **E. E. Wallace** was named chief product engineer, automotive and industrial brake products.

**Ozalid Division**, General Aniline & Film Corp., New York, appointed **Frederick H. Frantz** director of engineering, machine research and development; **Robert C. Goodman**, chief production engineer; and **Sheffield S. Campbell**, manager of quality control.

**Blaw-Knox Co.**, Pittsburgh, announcing integration of its manufacturing operations, named **S. J. Moran** vice president-general manager, foundry and mill machinery operations; and **E. C. Rook**, vice president-general manager, fabricated product operations.

**R. F. Hendren**, manager of plants, was elected vice president of **Chicago Bridge & Iron Co.**, Chicago.

**Walter W. Finke** succeeds **John J. Wilson** as president of **Datamatic Corp.**, Newton Highlands, Mass. Mr. Finke was vice president-general manager. Datamatic is owned by Minneapolis-Honeywell Regulator Co. and Raytheon Mfg. Co.

**David S. Holbrook** was elected president of **Algoma Steel Corp. Ltd.**, Sault Ste. Marie, Ont. He was executive vice president. **George W. MacLeod** was elected president of Algoma Ore Properties Ltd., and **Horace J. Allen** was elected president of Canadian Furnace Co. Ltd., subsidiaries.

**H. B. McClure** was elected a vice president of **Union Carbide & Carbon Corp.**, New York. **D. B. Benedict** was made president of **Carbide & Carbon Chemicals Co.**, a division, and **Dr. Franklin Johnston** was made its research director.

**Leonard Feldman** was made purchasing agent of **El-Tronics Inc.**, Mayfield, Pa. He succeeds **Frank Long**, now vice president in charge of contracts.

**Richard G. Nolte** was elected a vice president and general manager of **Duff-Norton Co.**, Pittsburgh. He was vice president and assistant to the president. Mr.

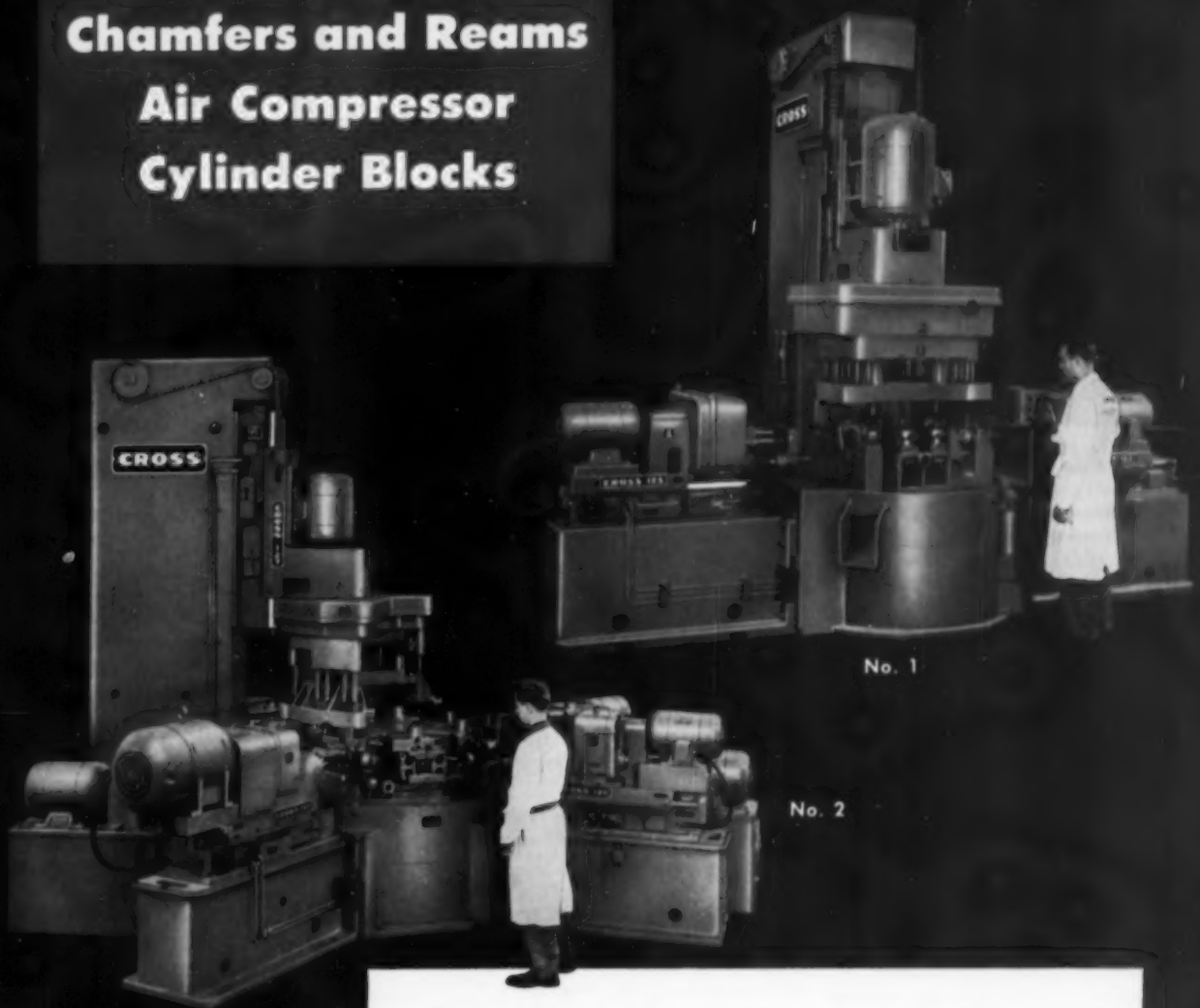
S. J. MORAN

E. C. ROOK

. . . Blaw-Knox vice presidents

*More Specials by Cross*

# Bores, Drills, Chamfers and Reams Air Compressor Cylinder Blocks

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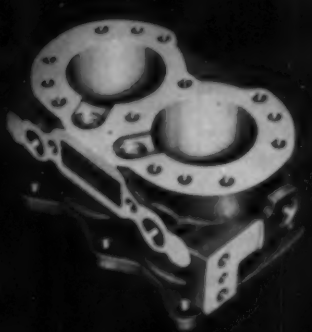

★ Rough and semi-finish bores cylinders; rough and finish counterbores valve ports; drills, chamfers and reams all holes.

★ 129 pieces per hour at 100% efficiency.

★ Machine Number One has 4 stations; 1 for loading, 3 for drilling, chamfering and reaming. Machine Number Two has 7 stations: 1 for loading and 6 for machining.

★ 2 position, progressive type work holding fixtures for both machines, each arranged to handle 6 similar parts.

★ All parts in Cross machines—even tooling details—are made to interchangeable tolerances for fast, easy maintenance and flexibility for part design changes.

★ Other features: Construction to JIC standards; hydraulic feed and rapid traverse; hardened and ground ways; automatic work cycle.

*Established 1898*

THE CROSS CO.

*First in Automation*

DETROIT 7, MICHIGAN

**FRANK J. COATES**
*. . . Vacuum Metals sales mgr.*

**A. H. LEWIS**
*. . . Crucible's tool steel sales mgr.*

**JOHN A. MATOUSEK**
*. . . assistant to Baker-Raulang president*

Nolte succeeds **E. M. Webb**, who will act as special consultant.

**Frank J. Coates** was made sales manager, **Vacuum Metals Corp.**, Syracuse, N. Y. The firm is jointly owned by Crucible Steel Co. of America and National Research Corp. Mr. Coates was formerly supervisor of stainless steel sales in the Cleveland branch sales office of Crucible.

**Richard D. Keller** was made assistant sales manager, machine tool division, **Pratt & Whitney Co. Inc.**, Hartford, Conn.

**Sava Sherr** was made chief mechanical engineer, **International Resistance Co.**, Philadelphia. He was president of Stanley Industries Inc.

**Jess D. McClendon** succeeds **H. H. Clark**, retired, as California division tubular manager, **National Supply Co.**, Pittsburgh.

**Karl W. Galliger** was made director of engineering for **New York Air Brake Co.**, Watertown, N. Y.

**A. H. Lewis** was appointed manager of tool steel sales for **Crucible Steel Co. of America**, Pittsburgh. He formerly was sales manager, Vacuum Metals Corp.

**W. C. Berg Jr.**, former roll sales engineer, was named assistant to the vice president and general sales manager, **Blaw-Knox Co.**, Pittsburgh.

**Stanford J. Barlett** was made manager, washer division, **Circo Equipment Co.**, Rahway, N. J.

**David L. Doty** succeeds **D. J. Taylor**, retired, as assistant chief metallurgist, Aliquippa, Pa., Works, **Jones & Laughlin Steel Corp.**

**Bennett W. Wright**, captain, USN (ret.), was appointed general manager, turbo division, **American Machine & Foundry Co.**, at Pacoima, Calif.

**Edward R. Kramer** joined **David Round & Son Inc.**, Solon, O., as chief development engineer.

**John A. Matousek** was named assistant to the president of **Baker-Raulang Co.**, Cleveland. He will aid on general staff problems and handle special assignments in fleet sales, new market and product programs and industrial relations. He was vice president-general manager. He joined the firm as manufacturing manager in 1949.

At **Armco Steel Corp.'s** Middletown, O., Works, **Don S. Holstein** was named assistant manager. **Ora E. Clark** was made general superintendent of all operations and **Donald C. Osborne**, assistant to the general superintendent. **Forest M. Morrow** was named area superintendent of the West processing, stainless and coating departments.

**Louis Meyer**, tool crib manager, was named superintendent of stores for **Morrison Steel Products Inc.**, Buffalo.

**J. E. Rehder** was elected vice president, **Canada Iron Foundries Ltd.**, Toronto, Ont.

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## *OBITUARIES . . .*

**John F. Smith**, 55, general manager, Century Foundry Division, **General Motors Corp.**, Saginaw, Mich., died May 26.

**Gordon Fox**, 69, retired vice president, **Koppers Co.**, died in Chicago June 6.

**Carl W. Johnson**, 69, senior vice president, **Clevite Corp.**, Cleveland, died June 5.

**John L. Slade**, 33, administrative assistant to the vice president, **Black & Decker Mfg. Co.**, Towson, Md., died June 1.

**Fred W. Elya**, 65, retired Northeastern district manager for **Norton Co.**, Worcester, Mass., died May 23.

**Burnett J. Minier**, 54, assistant general superintendent, **Erie Interlake Corp.**, Erie, Pa., died May 31.

**Harvey B. Mann**, founder of **Mann Engineering Co.**, Pittsburgh, died May 19.

# *New* Kearney & Trecker's "Bull's-Eye" Control Grouping

Available under Tool-Lease program

**TF Series milling machine's controls are conveniently grouped up-front where they belong to assure accurate settings ...measurably reduce operator fatigue**

ONE look tells why the new TF Series milling machines — Plain, Universal and Vertical — are so easy to operate. "Bull's-eye" up-front control grouping permits operators to achieve exact settings faster, more adeptly and with greater ease than ever before. This "Fron-Trol" convenience is the key to low-cost production . . . because it increases the operator's efficiency and measurably reduces fatigue through elimination of wasted steps.

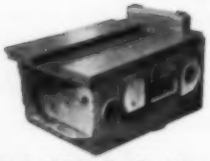
The "bull's-eye" knee and saddle-mounted controls are safety-interlocked and include feed selection, directional Mono-Lever table feed and rapid traverse, automatic cycle table feed and rapid traverse controls, front-mounted table handwheel, saddle clamping gib and backlash eliminator and hand and power directional controls for knee and saddle movements.

In addition, the new TF's give you a superior combination of outstanding design and operating features never before available on any other knee-type milling machines. They're built in five sizes — No. 2 to No. 6 from 10hp to 50hp.

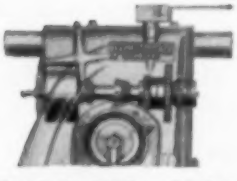
Why take less than the latest when you want new milling machines? You can get all the facts on new TF Series machines from your Kearney & Trecker representative — call him or mail coupon direct to factory today.

**A few of many reasons why TF Series milling machines are so easy to operate**

**Twin Screw Knee Support** — Exclusive double-support arrangement most effectively distributes weight of new machines' much wider, heavier knee, saddle and table. Balanced design substantially increases stability under heaviest loads . . . offers greater resistance to torsional thrust under all cuts . . . halves the wear factor, assuring greater, longer-lasting accuracy.



**Heavier, Wider, One-Piece Knee** — The TWIN SCREW arrangement supports the heavier, larger knee. Span and length of ways is increased considerably, providing fuller saddle support . . . lasting accuracy . . . substantial reduction of way and gib wear.



**Three Bearing Spindle** — Complete assembly consists of three heavy-duty bearings, flywheel, a train of wide-faced forged steel gears. Rigidity of spindle unit contributes to increased cutter life . . . excellent finish . . . quieter and vibrationless operation.

**Massive Column** — Solid back, double-box section column is scientifically ribbed throughout to rigidly withstand heaviest cutting forces. Full bearing column face affords maximum support for the knee. Cross-mounted motor assures maximum ventilation, easy access for routine maintenance.

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Please send me Catalog No. TF-50 with details on new line of TF Series Plain, Universal and Vertical milling machines.

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Company_____

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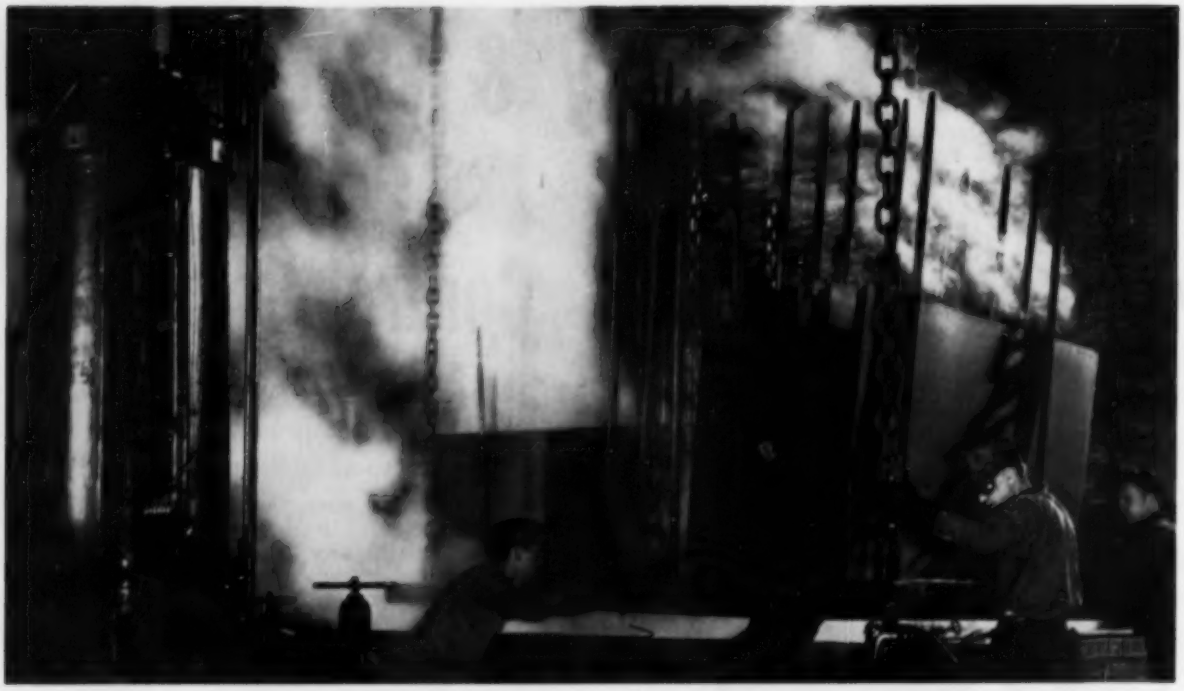

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**HOUGHTON PICKLING INHIBITOR COMBINES SUPERIOR BREAKDOWN RESISTANCE WITH STEEL-AND-ACID SAVING QUALITIES AND LOW PICKLING COSTS**

Acitrol's breakdown resistance keeps its steel-protecting power at a peak even when pickling baths are used for long periods at prolonged high temperatures. Acitrol is an easy-to-use liquid that can be added directly to either concentrated acid or the pickling bath. Acitrol works equally well in commonly used pickling acids, provides full protection for high or low carbon or alloy steels.

Acitrol's wetting action speeds pickling, gets acid under scale in a hurry. Steel and acid saved cut costs per ton of steel processed. Pitting and smut formation are prevented. Acid fumes are kept to a minimum. Bright, clear finish after pickling provides good adhesion for organic or metallic coatings.

Your Houghton Man will be glad to tell you how Acitrol can help you pickle steel more efficiently, improve finish quality and appearance and reduce pickling costs. Call him today, or write E. F. Houghton & Co., 303 West Lehigh Avenue, Philadelphia 33, Pa.

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HOUGHTON PRODUCTS FOR THE STEEL INDUSTRY

Hydraulic Fluids • Rust Preventives • Grinding Compounds • Cutting Oils and Bases • Special Purpose Lubricants • Heat Treating Materials • Leather and Synthetic Rubber Packings

# Republic Buys Half Interest in Cramet

REPUBLIC STEEL Corp., Cleveland, has purchased a half interest in Cramet Inc., a wholly owned subsidiary of Crane Co., Chicago.

Cramet's plant at Chattanooga, Tenn., was built under contract with the General Services Administration. The government advanced $24,950,000 for the project which went into partial operation last year. Reducing rutile into metallic titanium sponge, it is building up production to a rated capacity of 6000 tons annually.

In 1955, Cramet also began operating a titanium ingot facility and laboratory for the analysis and testing of metals.

Nearly all the initial output of titanium sponge is expected to be channeled to the Air Force. The remainder will be available to the joint owners or sold on the open market.

**Market Broadens** — Titanium is particularly suitable for supersonic aircraft airframes, engines and accessories, guided missiles and rockets. Reasons: Its favorable strength-weight ratio, its retention of strength at moderately elevated temperatures and its corrosion resistance.

As production increases, titanium is winning wider acceptance. New markets include the civilian aircraft, chemical, marine, food processing, pharmaceutical, atomic power, electronics and petroleum industries. In spite of premium prices, commercial uses are being slowly developed and should increase as melting and fabricating capacity rises.

The joint owners have wide experience and interests in titanium, ranging from raw materials through finished products.

Republic has been producing titanium products since 1950 and is replacing older melting equipment with more efficient furnaces.

Republic also fabricates the metal into alloy sheets, commercially pure strip, bars and forgings.

**Research** — Republic is expanding its titanium research laboratories. Projects include work on new titanium alloys, methods to more closely control hydrogen in the metal, possible methods of eliminating "metal fatigue" and the development of high tensile strength.

Since 1950, Crane Co. has had a research and development program dealing with industrial uses of titanium, particularly in the manufacture of valves, fittings and similar products. Fundamental research on all phases of titanium metallurgy, with particular emphasis on alloy development and physical properties, continues as an important activity of Crane's Engineering Research Division.

Both companies have sources of ore. Crane is developing rutile deposits at Aiken, S. C., and near Panama City, Fla.; Republic, in southwest Mexico.

**New Board**—Cramet will remain a separate corporation with this new board of directors: Representing Crane, F. F. Elliott, J. P. Magos, P. L. Yates and E. E. Wyatt; representing Republic, C. M. White, T. F. Patton, Norman W. Foy and E. R. Johnson.

## Ford Orders Annealing Furnace

Ford Motor Co., Dearborn, Mich., awarded a contract to Gas Machinery Co., Cleveland, for annealing furnaces to go into its Canton forge plant, Canton, O.

## Consolidated Buys Foundry

Crucible Steel Casting Corp., Milwaukee, a division of Consolidated Foundries & Mfg. Corp., Chicago, has taken over the operation of Crucible Steel Casting Co., Cleveland. The Cleveland operation will be conducted as the Cleveland branch of the Milwaukee firm.

## Boosts Electrode Capacity

Great Lakes Carbon Corp.'s Electrode Division, New York, plans to add more than 45 per cent to its production capacity of carbon and graphite electrodes, anodes, mold stock and graphite specialties. New facilities will be

(*Please turn to page* 129)

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
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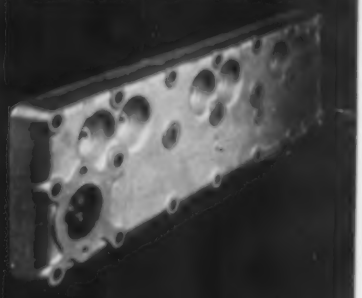
BORES MOTOR BLOCKS 22% FASTER— AND WITH 28% LESS TOOL WEAR



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Users everywhere report similar experiences. In fact, on 67 machining tests in 11 large machine shops, castings of grey iron treated with FERROCARBO averaged 89.5% greater machinability per tool than untreated castings. These premium castings are finer-grained, denser, stronger, yet they COST YOU NO MORE... because your foundryman, using FERROCARBO, makes worthwhile savings in raw material costs.

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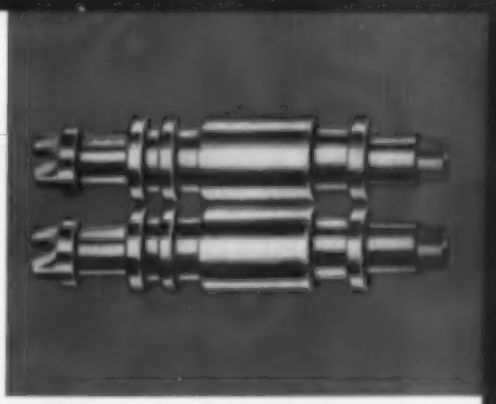
**CONTINENTAL** 40-inch, 2-high reversing blooming-slabbing mill in the Fairless Works of the United States Steel Corporation.



**ROLLS**—iron, alloy iron and steel rolls for all types of rolling mills.

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## makes what it takes to handle tough blooming-slabbing operations

**CASTINGS**—carbon and alloy steel castings from 20 to 250,000 pounds.

In operation as an intermediate mill for subsequent rolling, this rugged Continental 40-inch reversing blooming-slabbing mill is providing excellent performance in the United States Steel's Fairless Works.

Variations of the basic design of this mill are built by Blaw-Knox to serve as break-down mills for billet and bar mills, rail and structural mills, and merchant mills.

Blaw-Knox designs and builds complete rolling mill installations—assumes undivided responsibility from preliminary engineering to satisfactory operation. At any time we'll be glad to discuss your plans with you.

**WELDMENTS**—fabricated steel plate, or cast-weld design.

50th Anniversary
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***Foundry and Mill Machinery Division***

Blaw-Knox Building • 300 Sixth Avenue
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Complete Rolling Mill Installations . . . including all auxiliary equipment . . . for ferrous and non-ferrous metals

Hot strip mills • cold strip mills • slabbing mills • temper mills • universal mills • plate mills • blooming mills • structural mills • rail mills • billet mills • rod mills • merchant mills • roll lathes • chippers • special machinery • and complete auxiliary equipment

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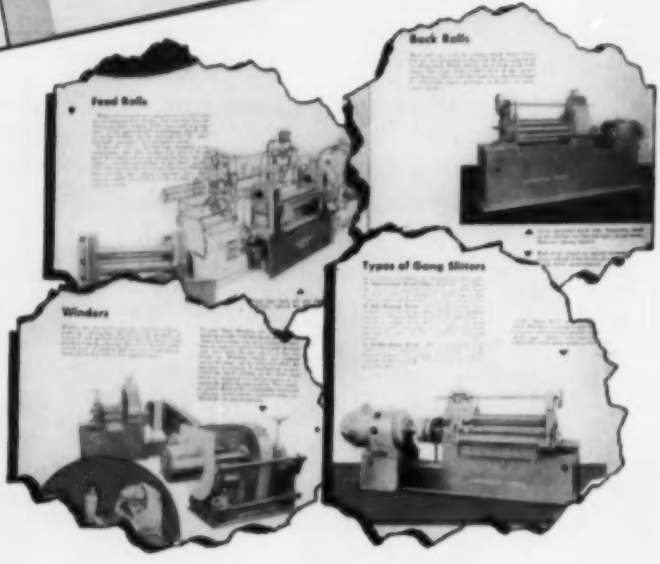


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Gives details on various slitter types as well as payoffs and coil boxes, loaders, straighteners, feed rolls, back rolls, cutters and spacers, stripper fingers, winders and coilers. Includes specifications and cutting capacity chart. Send for your copy.

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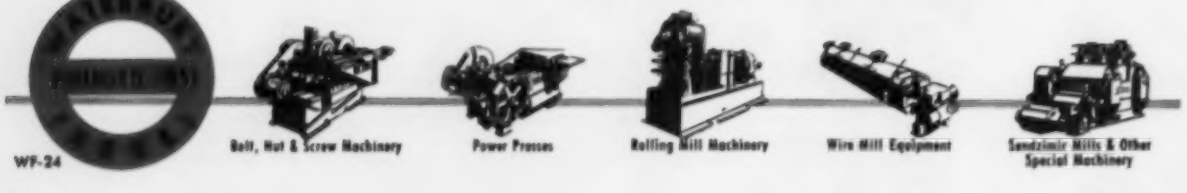



WF-24

(*Concluded from page* 125)

added at the division's plants in Morganton, N. C., and Niagara Falls, N. Y. The project is scheduled for completion in May, 1957.

## Stanley Works To Expand

Stanley Works, New Britain, Conn., will spend $500,000 over a two-year period for plant construction and new equipment. This will provide additional space for its Hardware Division and permit increased production by its Strapping Division.

## Coast Aluminum Opens Plant

Coast Aluminum Co. is producing residential aluminum casement windows in a new $750,000 plant in Gardena, Calif. Expansion to other aluminum products is planned when design and production will permit.

## Will Build Refractory Plant

General Refractories Co., Philadelphia, plans to build a basic refractory manufacturing plant at Gary, Ind. Products will include a complete line of chemically bonded basic brick, mortars, castables and other specialty products.

## GE Earmarks Expansion Funds

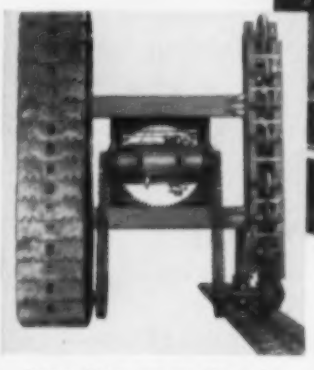
A $23 million expansion and modernization program covering the next five years has been announced by General Electric Co.'s Medium Steam Turbine, Generator & Gear Department, Lynn, Mass. Plans call for new buildings, equipment and manufacturing methods.

The company plans to invest an additional $20 million in small aircraft engine research and development during the next five years. This sum is earmarked for new facilities, including development and test equipment.

Another program calls for a $1.2 million expansion and modernization program for its Small Turbine & Supercharger Department at Fitchburg, Mass. A high-pressure boiler plant will be built; a $200,000, 10-ft vertical boring mill will be installed, and other smaller tools will be added to the production line.

GE also has awarded a contract for construction of a plant near

This Heavy-Duty 22-B with 50-ft. boom and 20-ft. jib loads drums of enamel onto a barge for a company in Follansbee, West Virginia.



Heavy-Duty mounting is available with flat or tapered ends and 26-, 30-, or 36-in. treads.

# Heavy-Duty 22-B Cuts Handling Costs

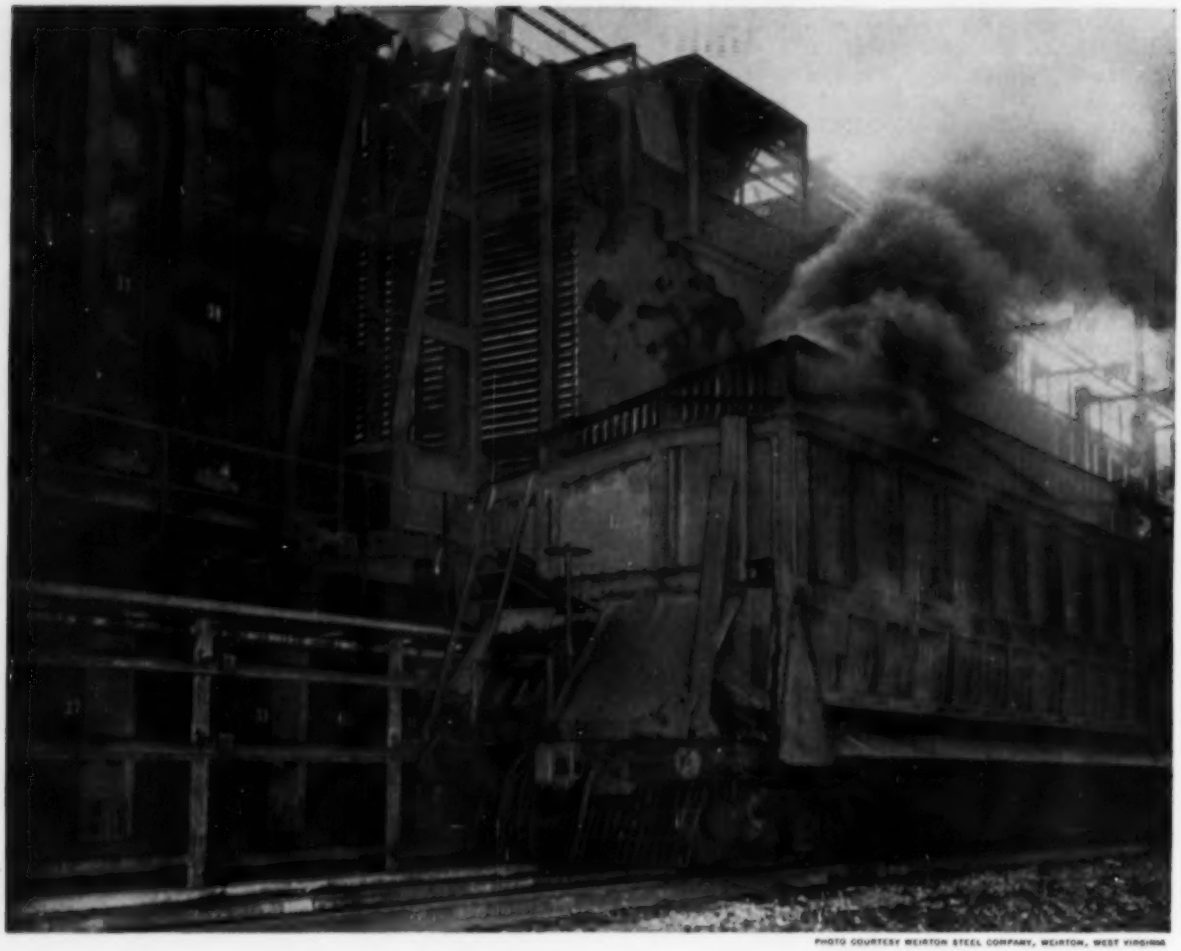
For material handling jobs around your plant, the Bucyrus-Erie Heavy-Duty 22-B crawler crane offers many money saving advantages.

Long-frame crawler mounting and low center of gravity provide great stability . . . make lifting of heavier loads possible. Extra-sturdy construction extends all the way up the boom, which is readily extended to 70-ft. length by using removable inserts. Additional 10-, 20-, or 30-ft. jibs also help you build your stockpiles higher. Four-way safety power controlled lowering for boom hoist plus independent control lets you inch heaviest loads into position. Propelling speeds provide for efficient moving. Fast moves can be made with the selective high propel speed; normal moves with low speed propel.

These features and many others add up to more efficient yard operation . . . less overhead. For more information, contact your nearby Bucyrus-Erie distributor soon. 248E56

BUCYRUS ERIE

SOUTH MILWAUKEE WISCONSIN



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# Breaking the "capacity barrier" starts here...

How can you produce enough hot metal to meet today's record-breaking schedules?

You know, for instance, that you get more out of the new higher grade ores. But you can also increase production regardless of ores by using better quality coke.

Island Creek coals, with their low ash and sulphur content . . . and excellent coking properties . . . enable your coke plant operators to furnish the improved coke that results in more iron . . . even cuts the cost per ton of iron produced.

This is more than a theory. It's being done . . . by leading producers who depend on Island Creek as a major source for quality coking coals.

We'll leave the rest of the story, the technical side, up to Island Creek coking coal specialists. They'll welcome an opportunity to discuss it with you.

YOU CAN DEPEND ON

*Island Creek coals are ideal, too, for industrial steam production.*

*Island Creek*

COKING COALS

ISLAND CREEK COAL SALES COMPANY, Chafin Building, Huntington 18, West Virginia

Chicago • Cincinnati • Cleveland • Detroit • Greensboro • New York • Pittsburgh

Lynchburg, Va., to house its Rectifier Department.

### Pressed Metals in Merger

Pressed Metals of America Inc., Port Huron, Mich., has merged with American Bantam Car Co., Butler, Pa. Pressed Metals will continue to manufacture its regular line of automotive parts at its present locations.

### Boosts Canmaking Capacity

American Can Co., New York, has leased a plant at 8651 E. Seven Mile Road, Detroit, for the installation of facilities to manufacture beer and soft drink cans. It will have an annual rated capacity of 160 million containers.

The firm is also erecting a canmaking plant in Blue Ash (Cincinnati), O. It will have about 240,000 sq ft of floor space and will have a rated annual capacity of 250 million cans a year.

### Holyoke Wire Expanding

Holyoke Wire Cloth Co. is constructing a $175,000, 23,000 sq ft plant in Holyoke, Mass.

### Opens Steel Valve Plant

Lunkenheimer Co., Cincinnati, opened its iron and steel valve plant at Fairmount, O. This is part of the firm's multimillion dollar program of consolidation and expansion of manufacturing operations. The new facility is adjacent to Lunkenheimer's bronze plant, which was completely modernized recently at a cost of $3 million.

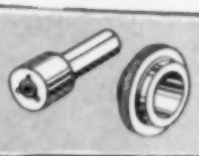
### Leeds & Northrup Opens Plant

Leeds & Northrup Co., Philadelphia, opened its plant for the manufacture of electronic indicating, recording and controlling instruments at North Wales, Pa. Costing $4 million for land and buildings and about $7 million for inventory and equipment, the plant is equipped with machine tools, engravers, winding and molding machines. Operations include heat treating, spraying and lacquering, calibrating, testing, assembling, tool and die making. Furnace pressure control and com-




*Shortest Route to Quality Control is via*
PRATT & WHITNEY

THREAD GAGES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PRECISION END MEASURES

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**shortest route . . .**
because Pratt & Whitney manufactures *complete* lines of conventional hand gages. You can select — from just one source — *all* the types and models you need to establish efficient quality control methods in your plant. A few of the many available are shown here.

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because into every Pratt & Whitney Gage is built an unmatched quality and accuracy that insures higher standards of precision maintained with complete dependability.

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on the right foot — write now for descriptive literature on the P&W Gage types you need. And if you want expert help in selecting the best gages for your specific requirements, call in a Pratt & Whitney Gage Specialist . . . there's one conveniently located in your area.

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MACHINE TOOLS • GAGES • CUTTING TOOLS

Remarkably quick, easy assembly and welding of the five .209" gage formed parts that comprise a modern compressor housing is possible because each part is precision formed to extremely exacting dimensions. Additional machining is not necessary. Each part is finished, ready for final assembly, as it comes off By-Products' new high speed press line.

*Now—fast stamping to close tolerances!*

## WHAT CAN OUR NEW PRESS LINE DO FOR YOU?

■ By-Products Steel Co.'s modern new high speed press line adds light gage pressing equipment to its already extensive heavy plate shaping facilities. The line will satisfy manufacturers who need precision formed parts from 16-gage material well into heavier plate thicknesses. And dependability is assured by the combination of the very latest equipment and skilled craftsmanship.

We've made the investment in equipment and manpower. You pick up the benefits in lower overhead...fewer production steps in your shop... reduced freight costs...virtually no scrap loss...lower production costs.

Get the facts! Write, outlining your interests, to Manager, Marketing Service, 832 Lukens Building, Coatesville, Pennsylvania.

**■ PRESS LINE UNITS**

1. 900 Ton Hydraulic Press
2. 600 Ton Mechanical Press
3. 150 Ton Punching Press
4. 45 Ton Punching Press
5. 22 Ton Punching Press
6. Trimming Press
7. Annealing Furnace
8. Washing Machine
9. Automatic Loader and Greaser

Units are linked by reversible conveyors for fast, economical production.

# BY-PRODUCTS STEEL CO.

LUKENS

A DIVISION OF LUKENS STEEL COMPANY, COATESVILLE, PENNSYLVANIA

bustion control are being moved to North Wales from a property near Wayne Junction, Pa.

## VACATIONS

**American Stamping Co.**, Cleveland, will be closed the first two weeks in July.

**Steel Improvement & Forge Co.** will close its Champion Division, 3685 E. 78th St., Cleveland, June 29 to July 16; its home plant, 970 E. 64th St., that city, Aug. 3 to Aug. 20.

Offices, warehouses and shipping departments of **Vulcan Containers Inc.**, Bellwood, Ill., will continue to operate from July 23 through Aug. 3 while production personnel in the steel pail department are on vacation. Limited tin can production will be continued.

## ASSOCIATIONS

**Magnesium Association**, New York, re-elected D. T. Wellman, Wellman Bronze & Aluminum Co., Cleveland, president; J. E. Pepall, Magnesium Co. of Canada, Montreal, vice president; J. V. Cosman, Superior Bearing Bronze Co., Woodbridge, N. J., treasurer. P. B. Craighead, Magnesium Products of Milwaukee, also was elected vice president. Jerry Singleton continues as executive secretary.

## NEW ADDRESSES

Headquarters of **Conlon-Moore Corp.**, manufacturer of household washers, ironers, vacuum cleaners and space heaters, were opened at 5558 W. North Ave., Chicago. Manufacturing operations at 1824 S. Laramie Ave. were transferred to the company's Joliet, Ill., factory.

**William K. Duff Co.**, New England representative for Holcroft & Co., heat treat furnace manufacturer, moved from Darien, Conn., to the Post Office building, Avon, Conn.


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your metal cleaning dollars with

**PERM-A-CLOR**

*(trichlorethylene)*

Your dollars will go a lot further if you buy a premium grade solvent. Detrex Perm-A-Clor is a premium grade trichlorethylene . . . available at the same price as ordinary solvent. Perm-A-Clor is mighty important to you because it:

1 *Assures less maintenance cost*
2 *Is easier to control*
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4 *Eliminates blind spots in your degreasing operation*
5 *Is more highly stabilized, thus lasts longer*

You get all these benefits, plus expert service assistance, for the same price as ordinary solvent. The result is that with Perm-A-Clor your production costs are reduced because you use fewer gallons of solvent per month. Mail the coupon for complete information.

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# Something more

# *than craftsmanship*

## produces that built-in accuracy of a *Hendey* Tool and Gage-Makers' Lathe

*The best is not good enough* for Hendey craftsmen who produce machines like our 9 in. Tool and Gage-Makers' Lathe — machines that give you toolroom tolerances easily, with no "tricks" or time-consuming adjustments.

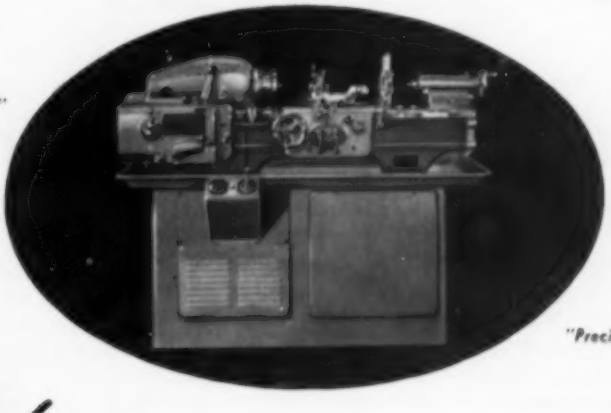
One of our men is grinding a spindle in the picture on the opposite page. It's the *care* he uses in determining wheel speed, feed, speed of work rotation, coolant flow, and wheel selection that makes the difference between a good spindle and a superior one. Experience tells him the proper relationship of these factors to the type of steel used in the spindle and the degree of hardness to which it has been processed.

Constant operating accuracy and maximum rigidity are assured because the spindle is mounted by other "craftsmen who care" in super-precision, antifriction bearings at both ends.

An electronically controlled drive is available for this 9 in. Tool and Gage-Makers' Lathe to give you quiet, infinitely variable spindle speeds from 15 to 3000 rpm. On facing cuts, stepped diameters, and tapers, you can change speeds during the cut by selecting the desired rpm on the control rheostat. Belt drive gives you smooth, vibration-free power to the spindle for fine finishes in the 25 to 3000 rpm range. Speed range from 15 to 250 rpm is achieved by back gears which operate at very low velocity.

When you're looking for the best in quality and quantity of toolroom output, look at this precision-built Hendey Tool and Gage-Makers' Lathe. Call your Hendey dealer for complete information about this machine.

*Hendey 9" x 24" Tool and Gage-Makers' Lathe*



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*Hendey* machine division
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69 LOOMIS ST., ROCKFORD, ILLINOIS

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GARLOCK SILICONE
RUBBER PRODUCTS

remain flexible at both high and low temperatures . . . ideal for gasketing on electrical and steam appliances, automotive and aircraft products. Won't stick to metal at high temperatures, either. And, silicone has no odor or taste, will not contaminate or corrode adjacent parts. Let us know your requirements. Garlock is equipped to handle even the most difficult thin wall extrusions.

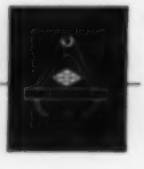
Extrusions and molded parts of Silicone Rubber are only part of "The Garlock 2,000" . . . two thousand different styles of packings, gaskets, and seals to meet *all* your needs. It's the *only* complete line . . . it's one reason you get unbiased recommendations from your Garlock representative. Call him today or write for Folder AD-147.

THE GARLOCK PACKING COMPANY,
Palmyra, New York

For Prompt Service, *contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.*

GARLOCK

*Packings, Gaskets, Oil Seals, Mechanical Seals, Rubber Expansion Joints*



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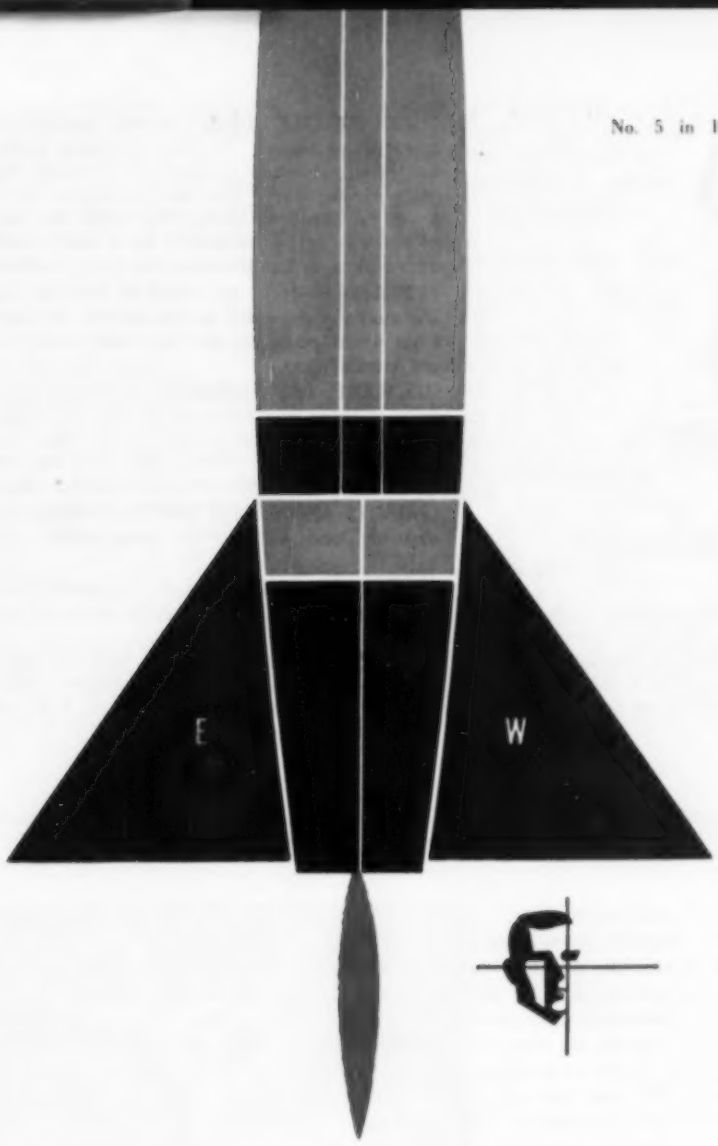
STEEL's
1956
Management
Series . . .

The editors of STEEL herewith present the fifth in their ten-part series, Program for Management for 1956. The complete list:

1. **It's Time To Grow**
   (Feb. 13, p. 81)
2. **Know Your Costs**
   (Mar. 19, p. 83)
3. **Ideas for Industry**
   (Apr. 23, p. 105)
4. **Metalworking Goes to Market**
   (May 14, p. 107)
5. **Metalworking's New Horizons**
   (June 18, p. 137)
6. **How to Live with SUB**
   (July 16)
7. **To Merge or Not To Merge**
   (Aug. 13)
8. **Motivating Men To Produce**
   (Sept. 24)
9. **Automation—Bogeyman or Bonanza?**
   (Oct. 15)
10. **Industry and College—Partners in Development**
    (Nov. 12)

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*




# Metalworking's New Horizons

**LATE LAST YEAR a New York businessman staked a claim on the moon. About as quickly as you can say "flying saucer," he found 9000 people who were willing to invest $1 in an acre of heavenly real estate. This lunar development is symbolic of the road ahead for metalworking.**

**You may not be aware of it, but you have a stake being claimed for you right now in the research and development laboratories which are working on missiles, satellites, atomics and other undertakings that are "out of this world."**

The scientist is a key figure in a world that has swung into a technical orbit. Industry is his workshop. Ideas born out of the needs of his job, where fiction is hard pressed to keep pace with fact, will exert their influence upon conventional manufacturing.

Detrex Corp., Detroit, has a case in point.

## Missiles Mean Business

Engineers at the Hughes Guided Missile plant, Tucson, Ariz., were in a dither. A speck of dust (invisible to the naked eye) on control mechanisms can cause a flying missile to veer widely off its course. The job was beyond normal production cleaning methods.

Hughes contacted the Detrex office in Los Angeles, putting in a rush order for the company's ultrasonic demonstration unit. Test runs proved that ultrasonic cleaning was the answer. Parts were flown daily from Tucson to the Detrex laboratory while an ultrasonic unit was being installed at Hughes.

**Chain Reaction**—The know-how

## *Looking for Missile Business?*

1. **POWER PLANT**—Missiles are rocket propelled. Production of rocket motors requires precision in forming, welding, brazing and machining high temperature alloys. Missile motors have potential civilian uses, such as take-off assists for heavily loaded planes and supersonic aircraft
2. **STRUCTURAL MATERIALS**—Potential market is for high temperature metals, cermets, insulating materials, refractories, refractory coatings and brazing alloys. Reentry of the missile into the atmosphere at 15 to 20 times the speed of sound may bring the temperature of the nose section to 5000°F for a few seconds. Many approaches to this problem are being studied
3. **PROPELLANTS**—Huge quantities of fuel are used. Missile men say the ideal propellant has not been found. Light metal powders and fuel with metal suspensions are possibilities
4. **LUBRICANTS AND HYDRAULIC FLUIDS**—Extreme conditions of shear and temperature are encountered. Applications are in fuel pumps, valves and controls that handle propellants. Ones that pass the missile test should find use in aircraft and industrial machinery
5. **SEALANTS AND GASKET MATERIAL**—Needed are high elasticity and stability at temperatures of −50 to +150°F
6. **ELECTRONICS**—Built-in electronic brains do the thinking. Just as in aircraft, electronics is assuming an increasingly major role
7. **TEST EQUIPMENT**—Maintenance and checkout call for test equipment based on new concepts. Practice is to "fly" an engine on a computer to see if it's compatible with the airframe

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gained at Hughes in this instance will spread far afield. Ultrasonic cleaning will be called upon to solve similar problems in countless plants making flight devices for aircraft and precision instruments. That's only the beginning.

Closer tolerances are forcing the development of more precise cleaning methods in the auto industry. Says D. J. Davis, vice president-manufacturing, Ford Motor Co.: "In hydraulic systems, for example, engineering specifications limit the size of foreign particles to 5 microns, which was unheard of several years ago."

Ultrasonic cleaning will find a market in motordom just as it did in missiledom. And from there? "The sky is the limit" has outlived its usefulness as a cliche.

### How's Your Imagination?

It's hard to realize how far we have penetrated this new industrial frontier, let alone figure out where newly blazed trails lead to.

Look at what Thompson Products Inc., Cleveland, said about the missile field in its annual report last year: "It has opened up vast new areas of technical development and engineering . . . Aside from combat uses, it seems certain that guided missile developments will lead to a new age of peacetime planetary and space travel . . ."

Look at what the president of a large engineering school says: "We are placing men in jobs that were nonexistent five years ago . . . missiles, rockets, rocket propellants, satellites."

Look at what the engineering vice president of a large aircraft firm says: "We are on the verge of significant technological breakthroughs. It does not seem inconceivable that we in our life span may witness man's flight into space in a satellite."

### Money Speaks

Will one of your products figure into the making of that satellite? It's possible.

The U. S. has already invested $5 billion in missiles. This billion-dollar-a-year business should reach (or go over) the $2-billion mark in three years.

The Air Force says that 20 per cent of the money earmarked for aircraft and major procurement in the fiscal year starting July 1 will go into missiles. This year only 12 per cent is allotted. In two years, the figure will exceed 33 per cent.

**Lunar Ship** — Millions will be spent to build and launch the first earth satellite—a sphere about 20 in. in diameter, weighing 21.5 lb. It will circle the globe at an altitude of 200 miles or more.

At the end of last year, the government had put $12.2 billion into atomic energy. A study made by the Atomic Industrial Forum concludes that industry and government will spend between $4.5 billion and $10 billion in the current decade (1955-1965) for nuclear reactor plants and related research and development. By 1965, the annual expenditure may be on the order of $2 billion a year.

### How To Break In

The missile business, for example, is operated on the "big package" basis. This means a contract is let to a large prime contractor. He is responsible for supplying the finished bird, plus auxiliaries, such as vehicles for servicing and transportation and test facilities.

Most metalworking companies will enter the missile program via subcontracts. The best way for neophytes to learn about what's needed is to go to a prime contractor or a subcontractor already in the field. Your district ordnance office can give you information on contracts, and who's doing what. Be sure your facilities and abilities are known in that office.

**Many Jobs**—In practice, production of the missile is usually divided into components, such as frames, propulsion systems, propellant, guidance devices and launchers. These segments are subcontracted, and companies getting this business may in turn subcontract.

The Nike system produced under Army contract with Western Electric Co. involves over 1000 subcontractors in 20 states.

Specialized governmental facilities, laboratories and proving grounds, conduct tests and supply service and advice to contractors along lines not normally available in industry.

You will find certain difficulties in going after missile business. There's the cloak of secrecy and, initially, there is often a high ratio of development costs to sales.

Your biggest problem will be finding how to fit into the program. Keep in mind: The potential rewards can more than compensate the effort.

## Infant Atomic Industry

We know enough about atomic energy to be optimistic. It points to a vast new business for many facets of metalworking.

This may be known as the year U. S. industry started to get into atomics in a big way.

**Evidence** — In the power generating field, ten private reactors are planned, several more proposed. One of the latest, proposed for Florida, is in the range of 200,000 kilowatts—big enough for a city of 250,000.

In the aircraft field, a B-36 with conventional power has carried out tests with an atomic reactor in its nose. This could lead to hundreds of reactors and to an industry measured in billions of dollars.

In the naval field, the atomic sub has caused a revolution—it can go around the world three times without surfacing.

Atomic engines are being readied for large surface vessels—such as aircraft carriers. In the shipping field, marine engineers say that

---

BELL X-2

*"We will conceive and build vehicles with speed ranges of Mach 10 to Mach 20 (7000 to 14,000 mph) that will operate at altitudes up to 50 miles in the next two decades. . . ."*

Lawrence D. Bell,
**President,**
**Bell Aircraft Corp.**
**Buffalo**

## *Plan for Supersonic Materials*

Bell Aircraft Co.'s supersonic X-2 (above) is the first airplane built to probe heat barrier problems certain to be encountered by high speed aircraft of the future.

Aluminum would lose much of its strength at speeds the X-2 will reach because air friction heats the plane's surface. This is the reason the greater part of the fuselage is of K-monel. Before the X-2, K-monel sheet stock hadn't been produced. The wings and tail are stainless steel—AISI type 302 in hard rolled tempers. There's also a place for titanium in the picture, although it wasn't used in the X-2.

An ordinary glass windshield would melt at temperatures the X-2 is expected to encounter. Bell used highly tempered glass that will stand 1000°F. At altitudes the X-2 is designed to reach, there are no dust particles to cut down the intensity of the sun's rays. Without special protection, the pilot could be seriously sunburned, so the windshield had to resist infrared rays.

The X-2 was fabricated completely by welding. Its power plant also may presage the future. It's a Curtiss-Wright rocket engine that develops power almost equal that used by a modern cruiser.

Reynolds Metals Co. cites a development that may keep aluminum in the supersonic material race. It's a new tubed sheet product with one side flat and a tubing pattern expanded on the other side. The idea is to pass a refrigerant through aircraft skins made of tubed sheet. Designers say this would beat the heat barrier where it originates—at the plane's surface. The other approach: Use heat resistant metals and refrigerate the crew and precision instruments.

## *What's Cooking in Atomics?*

- **ELECTRICITY**
  1. Large plants in the range of 100,000 kw or greater
  2. Small package plants of about 10,000 kw
- **PROPULSION**
  1. Ships—naval and merchant
  2. Airplanes—military and large cargo carriers
  3. Locomotives—power plant or electric locomotives that use electricity from small nuclear power plants located along route
- **ATOMIC HEAT**
  1. Space heating—low temperature reactors are easy to build, and there is no stack loss
  2. Process uses—high temperature reactions, coal gasification, etc.
  3. Waste heat—available as by-product of atomic power or atomic production plants. It's used at AEC's Hanford, Wash., plant to save 1.5 million gallons of fuel oil ($100,000) a year
- **ISOTOPES FOR CONTROL AND TESTING**
  1. Beta gage—determines thickness of sheet without touching it
  2. Flow tracer—measures flow of liquids
  3. Radiography of metals, testing fuels and lubricants
- **RADIATION**
  1. Food sterilization. U. S. Army and Container Institute have a $5-million project under way. Outcome could affect packaging
  2. Catalyst for reactions

---

atom-powered merchant ships will be plying world sea lanes within five years.

A bill introduced in Congress this year calls for construction of an atomic locomotive.

**By-Products**—Nearly a hundred companies, most of them on the smallish side, are selling $40 million worth of radiation instruments every year.

Tremendous possibilities are beginning to unfold for fission products. Rubber has been vulcanized by radiation; food products have been preserved "indefinitely"; plastics have been given greater toughness and heat resistance.

Other activities linked with the atom are prospering. The uranium industry, now a $500-million-a-year business, is profitable for a number of companies. Many will turn their holdings into cash ahead of Mar. 1, 1962, which is the expiration date for the government's guaranteed price. But there's a good chance governmental backing will be extended. Another mineral —thorium—may become a competitive atomic fuel.

### We Need More Fuel

Even the taming of the hydrogen bomb for commercial power will not make existing uranium and thorium reactors obsolete overnight. As world population grows and standards of living rise, we will need all possible sources of energy—coal, oil, atomic fission, fusion and even solar energy.

The nonweapon potential of the thermonuclear (H-bomb) reaction is staggering. Lewis L. Strauss, chairman of the U. S. Atomic Energy Commission, said recently: "I am confident that the day will come, although probably not for years, when the way will be found to produce nuclear power by harnessing the same energy release we assume is taking place in the sun—the process of controlled fusion of light nuclei.

"Scientists in the commission's laboratories are at work on the problem, searching for the key that could revolutionize the atomic art."

One company found that its product already is being used in experiments to develop a device to run a controlled thermonuclear reaction. Superior Tube Co., Norristown, Pa., had an order for a composite of a round tube drawn over two half-round tubes, with a mechanical bond.

Project Matterhorn at the James Forrestal Research Center, Princeton University, reports that the tubing is being formed into a coil. The over-all objective, just declassified, is to control the hydrogen bomb reaction for peaceful uses.

### Atom in Your Business

The first requisite for a company that wants to get into atomic energy is to have someone on its management team who understands the basic principles and problems involved.

Great technical knowledge is not needed, but management should know what the problems are, how to evaluate opportunities and who's doing what. It's a good idea to select one person (or more) at a lower level, and make it his responsibility to really learn the

atomic business. He can advise management on the more technical aspects.

**Another Point** — Make a hard-boiled appraisal of your skills and facilities. Use your assets as realistically as you do in the development of other new products.

The potential is there. Your most important job: Find the right niche. Chart a long-range program, and don't be too impatient for profits. They'll come over the long pull.

**Develop Talent**—The best course for a company to take has to come from its own management. It's generally not a job for outside experts. They cannot have a complete understanding of your company's skills and program.

There's a vast market for suppliers to the government's atomic energy program. A good place to start might be with an AEC contract or subcontract to gain experience that can be applied later in the civilian atomic energy business.

The AEC is taking a number of steps to help business to get into atomic energy. In the last few months it has been letting industry learn more about what the government is doing and is exchanging atomic information within industry. Some 800 permits have been granted to give companies access to secret and confidential information.

Patent regulations have been liberalized and licensing requirements for fuel element fabricators dropped. The commission no longer insists on royalty free nonexclusive licenses to inventions based on access to restricted data.

If you need help on the new AEC rules, contact: U. S. Atomic Energy Commission, Division of Civilian Application, Washington 25, D. C.

### Atomic Material Mart

Just as supersonic aircraft and missiles are creating a new market for metals, so is the atom. A new requirement is added: Nuclear properties.

For neutron economy—which in the future will be dollar economy—structural materials used in atomic power plants must have a low neutron absorption. Zirconium and beryllium are of most interest.

---

## *Get Ready for Atomic Business*

*"The manufacture of components for reactor plants will be more than a $700-million-a-year business by 1963. . ."*

Atomic Industrial Forum, New York

**$200 MILLION**

Fuel Element Fabrication: Needs the greatest emphasis in research and development. The stakes are big and ingenuity will pay off. Not to be overlooked: It's a repeat-order business

**$120 MILLION**

Reactor Vessels: Practically all nuclear systems require a pressure vessel to hold the fuel and coolant. Many fabrication jobs in this area will justify developing the know-how needed

**$104 MILLION**

Pumps: Reactors will use many different kinds of pumps. There are still many developmental aspects. Pumpmakers should stick with more conventional designs to develop less expensive models

**$97 MILLION**

Piping: Requires welding skills of the highest order. Once a system is put into operation and gets "hot," its maintenance may create a market for remote welding and cutting equipment

**$80 MILLION**

Control Apparatus: This is equipment designed to control or stop the chain reaction. Many ingenious mechanical and electrical devices that equipment manufacturers can develop will be needed

**$70 MILLION**

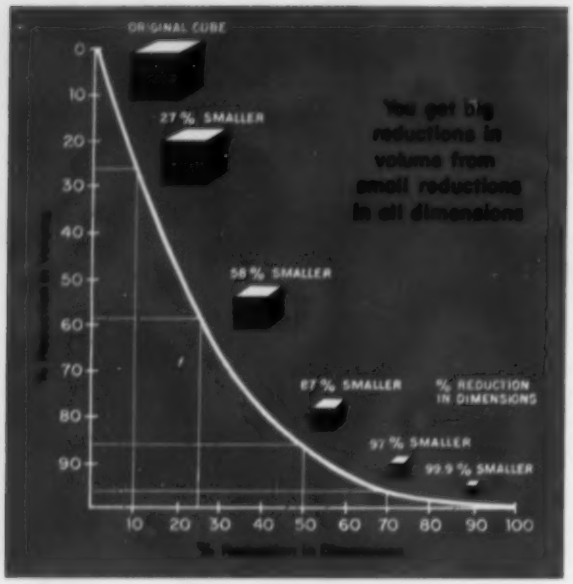
Heat Exchangers: Those already in the business can use their basic skills to get into the atomic end. They will find technical demands more stringent and should be prepared to do engineering development. Skill in devising cheap inspection methods is important

**$70 MILLION**

Instruments: The market for standard instruments will grow because much of reactor instrumentation will be standard. The need for simple instruments opens the door for manufacturers to apply their experience to the complex problems of atomic power

**$40 MILLION**

Valves and Fittings: Almost any leakproof valve of the size needed in an atomic power plant is a development item. Requirement for valves to automatically open or close on failure deserves study by seasoned valvemakers




*"Industrial management should make more of miniaturization. It's shaping up as a vital force in the American economy of the future."*

H. Thomas Hallowell Jr.,
President
Standard Pressed Steel Co.
Jenkintown, Pa.

## *Put Miniaturization To Work for You*

You can probably sell more by giving your customers less—if "less" refers to size and weight. Smaller, lighter products are always welcome, but the ability to put more service into a given space is often a bigger advantage.

The newest thing about miniaturization is the way we are looking at it. Management sees that sales can be

---

The stainless steels will be widely used in reactor accessories and components.

**Brakes** — Moderator materials slow down neutrons from their high fission energy. Materials used must have low atomic weight and low neutron absorption. Beryllium is the only metal that meets the requirements. Nonmetals, such as hydrogen, heavy hydrogen and graphite, can be used.

Control materials absorb neutrons and make it possible to control a reactor. Although most metals have a neutron absorption which is too high for atomic structural use, in only a few is it high enough for use in controls. Metals in the picture are hafnium, certain rare earths, cadmium, boron and gold.

**Effective** — Gadolinium, a rare earth metal, is more than 300 times as effective as hafnium. But at today's price, it remains pretty much of a laboratory curiosity.

Weight is a critical problem of nuclear powered aircraft, locomotives and ships on the drawing boards. The superior shielding given by a thin sheet of gadolinium may open up a promising future for the metal. It is one reason why a number of companies are getting set for an all-out attack on the rare earths.

The most important effects of atomic energy on the metal industries will be indirect ones. Of course, tons of zirconium, hafnium, beryllium and other metals with special nuclear properties will be used directly, but the intensive development of these metals is bound to be a stimulus that will carry them far into other fields.

### New Horizons for Metals

The broader look in metals points up many possibilities. Of some 80 metallic elements, less than 30 have been developed as metals or as alloying elements. Rarity of occurrence probably will keep a few from ever becoming important. Others are not used because technology has not advanced to the point where latent usefulness can be recognized.

**Circle**—On this point some metals may suffer from a vicious cycle. There may be no demand for them because their price is too high, and their properties are not well enough known to attract applications.

Take rhenium. Three years ago it was available in laboratory quantities as a metal powder.

Research was done to define its properties, bringing out its value as an electrical contact and electronic filament material.

Now you can order rhenium in common fabricated forms. It's becoming an important cog in our economy because its technology received the needed push from an interested company.

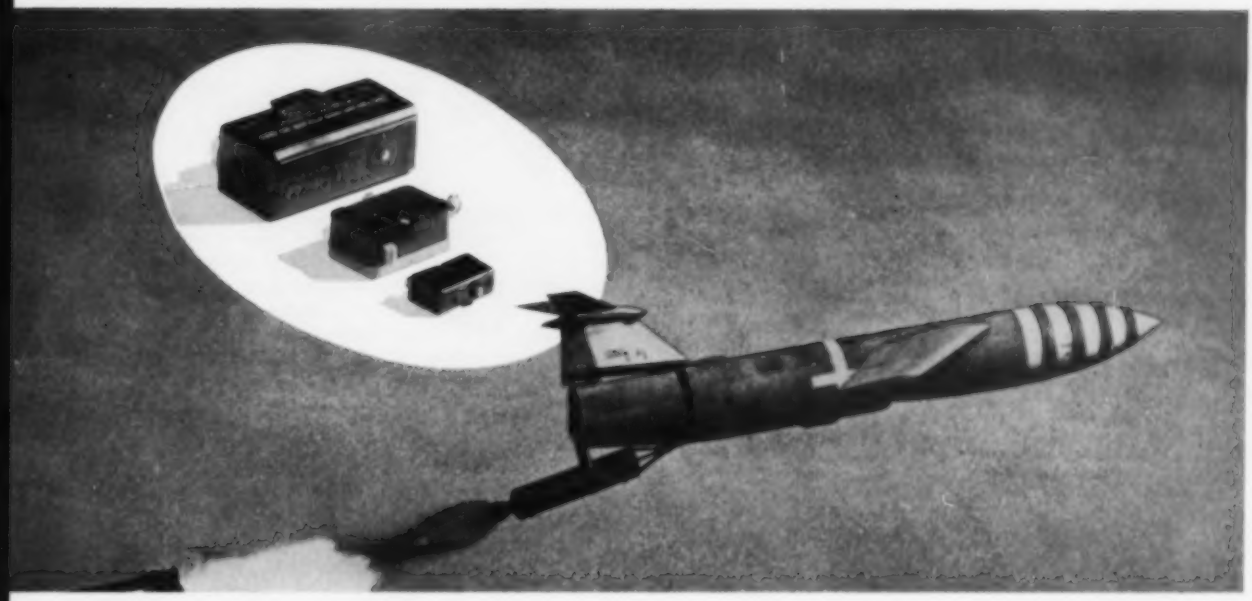
**Brighter Future**—The increasing complexity of technical progress will demand more materials with the special properties of the scarce and ultrahigh purity metals.

Says Clyde Williams, president, Battelle Memorial Institute, Columbus, O.: "In the whole science of rare metals more is unknown than is known. We have just enough information to suspect that these unused metals constitute a reserve storehouse from which we can draw new and unusual materials to supplement the more familiar ones in building our industrial future."

**Needed, Too** — The development of new metals opens up new markets for metalworking machinery to handle them.

About four years ago, DoAll Co., Des Plaines, Ill., started work on a precision slicing machine for germanium and silicon. The sensitivity of these metals to the slightest shock was the big problem.

The machine now being sold to electronic partmakers is a complete package that slices these fragile metals into thin wafers and saves the grinding dust which is worth $400 a pound.



The Martin Matador uses subminiature switches

increased by making products smaller, lighter, portable or more functional.

If you make parts and components, miniaturization is one of the surest routes to competitive advantage. Other applications demand miniaturization. Equipment is being built to operate faster at higher temperatures and pressures. This means new problems of inertia, centrifugal force, creep and stress that call for stronger, more compact components. There's a need to pack more equipment into a given space. Aircraft, for example, need more radar, more oxygen, more cooling capacity.

Makers of hydraulic systems are increasing their design pressures from 1000 to 5000 psi to supply more compact control systems to machine tool builders. Pistons and cylinders cut one-fifth in size perform the same work they did before.

To get a compact blower for space saving heating and air conditioning systems, the Iron Fireman Mfg. Co., Cleveland, developed an "inside-out" motor mounted within the fan. The armature and shaft are stationary, while the motor field and fan revolve around it—the reverse of conventional motors.

There are firms that offer help on practical miniaturization. Elgin National Watch Co., Ordnance Division, Elgin, Ill., has a staff of miniaturization designers. They are specialists in making parts and assemblies smaller, or in making one unit do the work of two or more—two routes to miniaturization, the company says.

A striking example of practical miniaturization is in snap action switches. The Martin Matador tactical missile (photo above) uses a subminiature switch developed by Micro Switch, division of Minneapolis-Honeywell Regulator Co., Freeport, Ill. Subminiature switches also are used in many other products, including machine tools.

The inset photo shows the sequence of miniaturization Micro Switch took: Switch on left is pre-World-War-II model; center one was developed during World War II; one on right is the recent subminiature. The company is working on a smaller version of the subminiature. It will probably be called the subminiature, subminiature.

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## After Atom: Solar Energy

The sun offers an inexhaustible source of energy. Harnessing it poses big problems. But there are signs of a technological breakthrough.

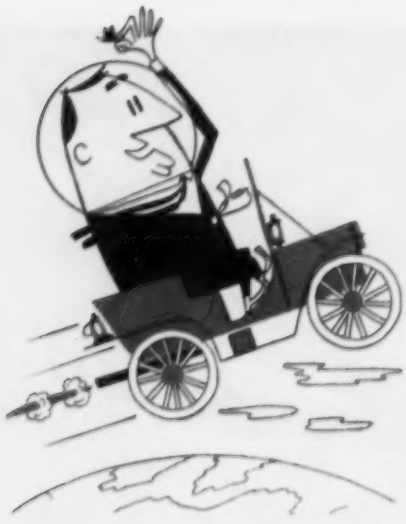
Spokesmen for the Association for Applied Solar Energy say: "The most important developments will take place at the two extremes of the temperature scale. For moderate temperatures, such as hot air and hot water, we will find a rapid increase in application of the sun's heat in the southern parts of the U. S. and in other warm sections of the world. At the other end the temperature scale, we will see rapid development of solar furnaces for extremely high temperature uses.

"We feel that the newly developed built-in-tube sheet materials (Revere Copper & Brass Co., Olin Mathieson Chemical Corp. and Reynolds Metals Co.) will find ready application in solar heaters."

**Ultrahot** — Solar furnaces that hit 8000°F or more are being built to test the resistance of aircraft and atomic construction materials.

Scientists at Bell Telephone laboratories came forward last year with the first device for converting sunlight directly into substantial amounts of electricity. The Bell solar battery uses wafers of high purity silicon and gives enough electricity to run a rural telephone system at Americus, Ga.

Small engines using solar energy



## *Auto Makers Search for New Horizons*

"Improved quality and reduced manufacturing costs demand development of more special machinery and processing techniques . . . We have in most cases passed the point where more effective utilization of standard machines and tools can give us the improvements we need . . .

"In mechanization of manufacturing, one of the greatest areas for potential improvement is in assembly. A far greater percentage of labor is involved in this type of work than in machining and fabricating processes."

**G. R. Fitzgerald, director, Process Development Section, General Motors Corp., Detroit**

"The time is not far distant when bodies will be automatically assembled. Jigs will place the side panels, roof and floor pan in place for welding and then be automatically removed. No workers will be needed except to operate controls."

**O. W. Franke, manager, Central Production Engineering, Chrysler Corp., Detroit**

"With the machine tool industry recognizing the advantages of electronics there will be many changes in the near future. Fixtures may even be operated by antigravity controls which may hold the part in mid-air while electronic or nuclear material disintegrators automatically remove material in seconds, controlled by an electronic tool engineer."

**Harry M. Adams, automation specialist, Chrysler Corp., Detroit**

"The storage of the enormous amount of material in process is giving many plants a serious problem. We believe this condition will be alleviated with mechanical stackers for small parts . . . overhead storage conveyors for large parts."

**A. G. MacDougall, Master Mechanic Division, Buick Motor Division, General Motors Corp., Flint, Mich.**

"Cold forming holds promise for such parts as stepped shafts for transmissions, which in many cases can be produced at less cost than that of the raw bar stock to machine them. Many steering and engine parts now made by hot forging or screw machines will be produced by cold forming in the future."

**Ray P. Powers, vice president-operations, Studebaker-Packard Corp., Detroit**

"Transfer machines are today's ultimate in productivity and specialization. However, they are not flexible enough for product design changes without extensive rework."

**D. J. Davis, vice president-manufacturing, Ford Motor Co., Detroit**

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are expected to become important in tropical countries for such chores as refrigeration and pumping water.

**In the Business**—Reynolds Metals Co. says it has a solar furnace under development for use in preparing food in tropical and semitropical countries.

Scott-Atwater Mfg. Co., Minneapolis, is thinking of a solar motor to power outboard motorboats. The sun's rays would be trapped by a concave disc and converted to energy that can be stored.

### Electronics and Machines

Electronics is becoming the means of doing many industrial jobs in a way that permits greater speed and accuracy.

This is possible because a science of electronic control is being evolved that works on a feedback principle like that of the human nervous system.

Computers and other electronic devices that use feedback will become substitutes for brains, just as older tools and machinery were substitutes for muscle.

Feedback control has been used most extensively in chemical process and petroleum refining industries. It is headed for great progress in metalworking and metal processing and, through the medium of the electronic computer, in offices as well.

### Sign of the Times

If science announced plans for sending a manned space ship to the moon, you can be sure passengers would be waiting in line.

This may be carrying faith to the extreme, but the public's fervor for the "new" even evidences itself when something as down to earth as a new household appliance is introduced.

Makers of consumers goods feel that the acceptance of technology and progress is at an all-time high. A new scientific principle is revealed, and the buying public expects its immediate application to products.

This puts companies on their toes. They must satisfy the hunger for technological innovations or their competitors will. Nothing seems too hard or impossible to produce.

Technology will open up limitless horizons for metalworking. Have you purchased your acre on the moon?

# Do You Have An Effective Machine Load System?

1 Is it flexible?
2 Do you know your shop capacity for new work — right now?
3 Can you easily revise your schedules?
4 Can you quickly tell what jobs constitute the load on each machine?
5 Are you performing in accordance with your preplanned schedule?

## if not, you're undoubtedly promising deliveries that cannot be met!

An effective machine load system is of invaluable aid to your sales department because with such a system, promise dates are given which *can be met*. The ability to meet these dates gains new customers and increases good will.

Why not send today for a free folder which illustrates in detail a simple but effective means of controlling the machines in your shop. Write Remington Rand, Room 1674, 315 Fourth Avenue, New York 10. Simply ask for KD738—"An Effective Machine Loading System."

**Remington Rand**

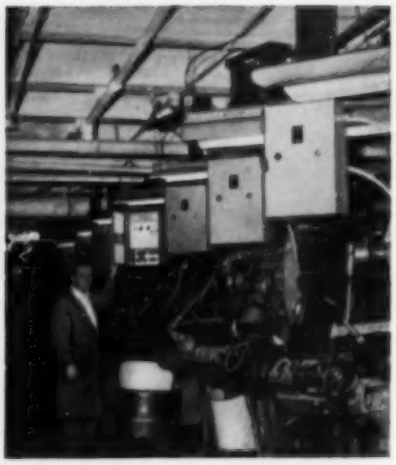
DIVISION OF SPERRY RAND CORPORATION

Sperry

# ultrasonic inspection news

## AUTOMATIC INSPECTION AND CONTROL ON CONTINUOUS PRODUCTION LINE

Continuous inspection of steel tubing and strip at production speeds is now an accomplished fact with the new Sperry Ultrasonic Reflectoscope® and RA attachment. This unit scans material traveling at high speeds and registers the presence of both internal and surface defects. Far more thorough than the human eye, it provides for both defect recording and signaling in addition to continuous inspection. Designed to incorporate signal lights or alarm bells, as well as automatic marking and machine cut-off units, the Sperry Reflectoscope and RA attachment is a flexible, accurate instrument which opens a new area to more effective cost-cutting quality control.



## *Electronic Protectron Senses Overloads— Minimizes Press Damage*

A punch press attachment, which detects the slightest overloads caused by pile-ups, misfeeds, tool dullness, misalignment, the Sperry Protectron minimizes tool and die damage by warning signals and actuation of control devices. The Protectron also cuts costly equipment damage and keeps all automatic machines running without close attention. With Protectron on guard, one man can safely and easily operate several machines at once.

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# Technical Outlook

**WELDING 200**—The new chrome-manganese-nickel grades of stainless (200 series) weld as easily with common methods as comparable members of the 300 series, says Allegheny Ludlum. Welded samples of 16-gage sheets showed slightly higher tensile strength, yield strength, elongation and bend angles than their 300 counterparts. Higher heat or slower welding speeds than for 300 steels are recommended.

**COOL, MAN, COOL**—At the Oldsmobile Forge plant in Lansing, Mich., the air conditioning system blankets hot metal workers with 5000 cfm of evaporator-cooled air moving at 3000 fpm. Even that air circulation doesn't affect the radiant infrared heat from furnaces and hot forgings. Where radiant temperatures run high, aluminum protective shields have been installed.

**NUCLEAR BUSINESS**—National Research Corp. has a contract to study problems of remote fuel element fabrication for the fast breeder power reactor. This reactor uses a high fraction of fissionable material in the fuel. Low burn-up makes short cycle, pyrometallurgical reprocessing of the fuel desirable, costwise. But high radioactivity requires remote facilities throughout the process. Atomic Power Development Associates Inc. (44 private companies) is footing the bill.

**CHECK ON QUALITY**—"All cars leaving our plants owe some of their quality to radioactivity testing techniques," say H. A. Tuttle and G. E. Noakes, Ford Motor Co., in a report at the SAE summer meeting in Atlantic City. Radioactivity is used in: Radiography, nondestructive testing, gaging and control, tracer techniques and static neutralizers. It's used in foundry operations to check stock and metal levels in cupolas and the distribution of additives. In steelmaking, it checks assimilation of ore concentrate fines and the thickness of rolled sheet steel. Another application: Measurement of pipe and wall thickness in pressure lines and engines.

**ANYONE FOR GLASS?**—A. O. Smith Corp. has developed over 3000 glasses in the last 25 years, but usage boils down to about 20. Biggest use: Glass lined tanks and containers. Name the corrosive substance you want to protect against (water, soil, chemicals, vapors), and there's probably a glass to fit it.

**MORE VACUUM MELTING**—Allegheny Ludlum is selling patent rights and know-how on consumable electrode vacuum remelting of steel and ferrous group alloys to Midvale-Heppenstall Co., Philadelphin. The process will be the same as that used in a new production department Allegheny Ludlum opened at Watervliet, N. Y., in 1955. The alloys are in great demand for jet engines.

**CERAMIC TOOL**—A ceramic tipped cutting tool developed by Raybestos Division, Raybestos-Manhattan Inc., Bridgeport, Conn., has the ceramic tip bonded to a steel shank instead of being clamped in a holder. The tip is an oxide based material. The tool is to be sold under the tradename "Keramik."

**MILLING SOLUTION**—Steel and titanium are being milled chemically on a pilot line at Turco Products Inc., Los Angeles. The firm helped North American Aviation develop its Chem-Mill process for aluminum and magnesium.

*Metalworking Outlook—p. 91  Market Outlook—p. 215*

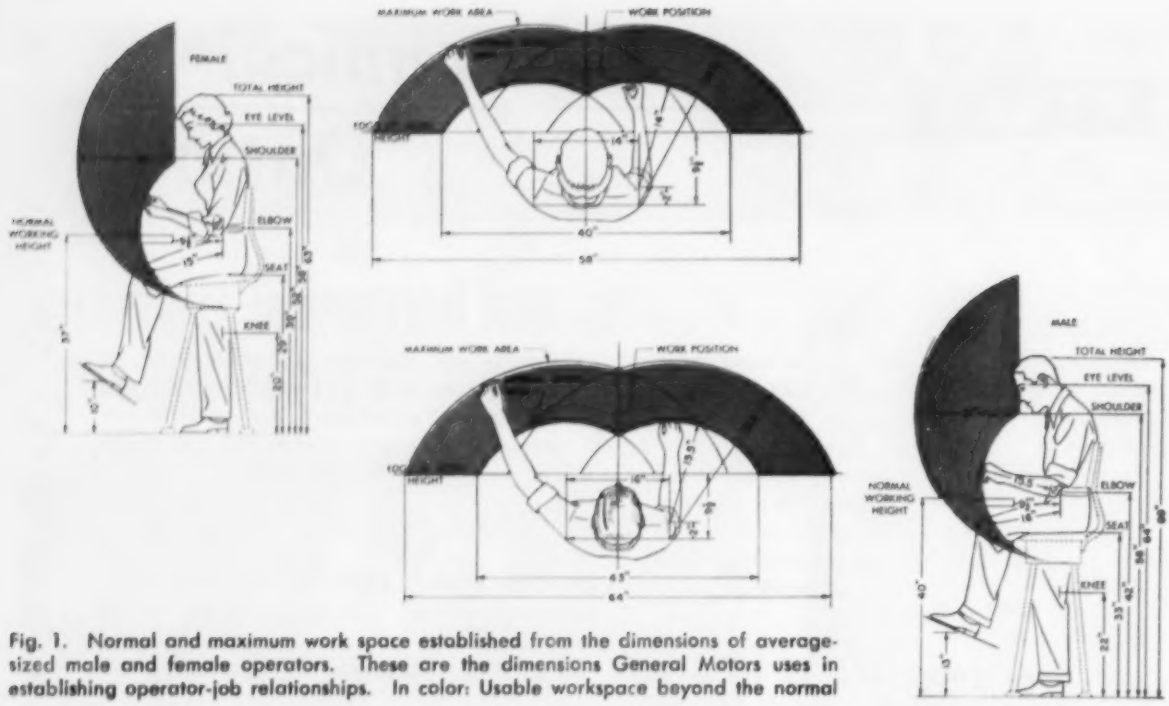


Fig. 1. Normal and maximum work space established from the dimensions of average-sized male and female operators. These are the dimensions General Motors uses in establishing operator-job relationships. In color: Usable workspace beyond the normal

# Design with Man in Mind

MAN AND MACHINERY work together. Methods engineers accept this relationship as a common element in any development area—even in so-called automatic machines.

In accentuating the importance of the operator, methods engineers consider: 1. His physical capabilities and limitations. 2. His psychological and physiological mechanisms. These are established, evaluated and designed into the system, along with the electrical and mechanical elements.

Here is how General Motors applies the man-machine concept:

**Work Space**—This is the total space in which an operator performs his duties. Normal work space is considered to be the area covered by the horizontal forearm pivoting about a relaxed vertical upper arm. It is generally established on the basis of an average-sized operator (Fig. 1).

Work space up to the operator's maximum reach is possible,

By RICHARD R. FARLEY
Process Development Section
Manufacturing Staff
General Motors Corp.
Detroit

but normal work space is desirable because it means minimum movement. The shorter the movement, the less fatigue and less time required for movement.

**Manual Activity** — When the boundaries of the work space have been defined, it is logical to establish the manual operation to be performed within them. You need a method of recording. An operation may be recorded by motion pictures, but the expense of equipment and photographic personnel is not always justified.

An alternate procedure is a written description. It must be a detailed study of both of the operator's hands, a record of the sequence in which operations are performed, and the time that it takes to perform them.

**Muscular Exertion**—Equally important is force. Important design concepts that consider the force an operator must apply to produce a motion are these:

1. Motions should have their line-of-travel path intersect the shoulder pivot point (Fig. 2).

2. Rotary motions should have their axis of rotation perpendicular to a line drawn from the center of motion to the shoulder pivot point (Fig. 2).

3. All muscular forces not directed through the shoulder pivot point are vector components of the force that could be applied through the shoulder pivot point.

Unfortunately, these concepts do not have quantitative values. We need to know their magnitude, frequency and direction. Such values must be established in order to perfect future man-machine systems.

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**Eyes Front** — Visual displays, such as gages, dials and lights, are used extensively in man-machine systems. They require the engineer to carefully evaluate the human element. For example, a signal light must not be objectionable, but must be strong enough to give decided contrast.

Visual displays are generally of three types: 1. Check or on-off. 2. Qualitative or directional. 3. Quantitative. A familiar example of such a system is the automobile instrument panel (Fig. 3).

**Group Meaning**—How visual displays are placed, grouped and designed is as important as what is displayed. Displays must be both accessible and readable.

Similar display dials should be grouped to produce a symmetrical pattern. Then any deviation from the mean value will impart a lack of symmetry which is easily detected, (Fig. 3). The pattern should also depend on frequency and sequence of use, which often results in a compromise.

Hearing is also a component of design, but often neglected. Reaction time for an auditory signal is about one and one-half times as long as for visual response. Repeated auditory signals may be objectionable. Auditory signals are normally saved for infrequent use, such as an emergency warning.

Fig. 2. Putting muscular force to work. For best performance, line of travel for straight line motion should intersect the shoulder pivot point. Axis of rotary motion should be perpendicular to a line extending from the shoulder pivot point to the center of rotation

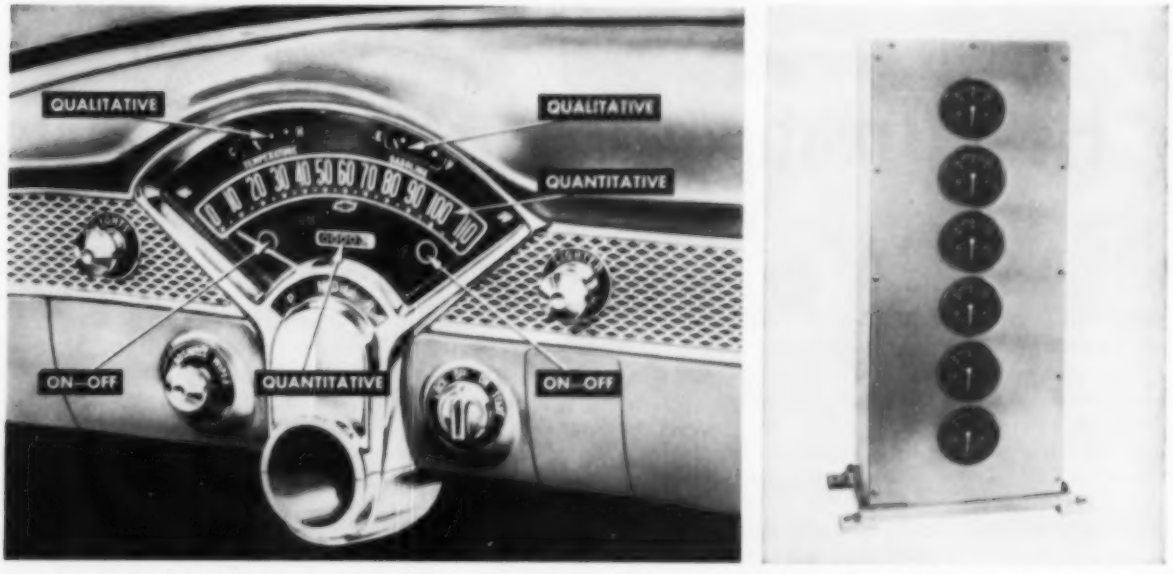
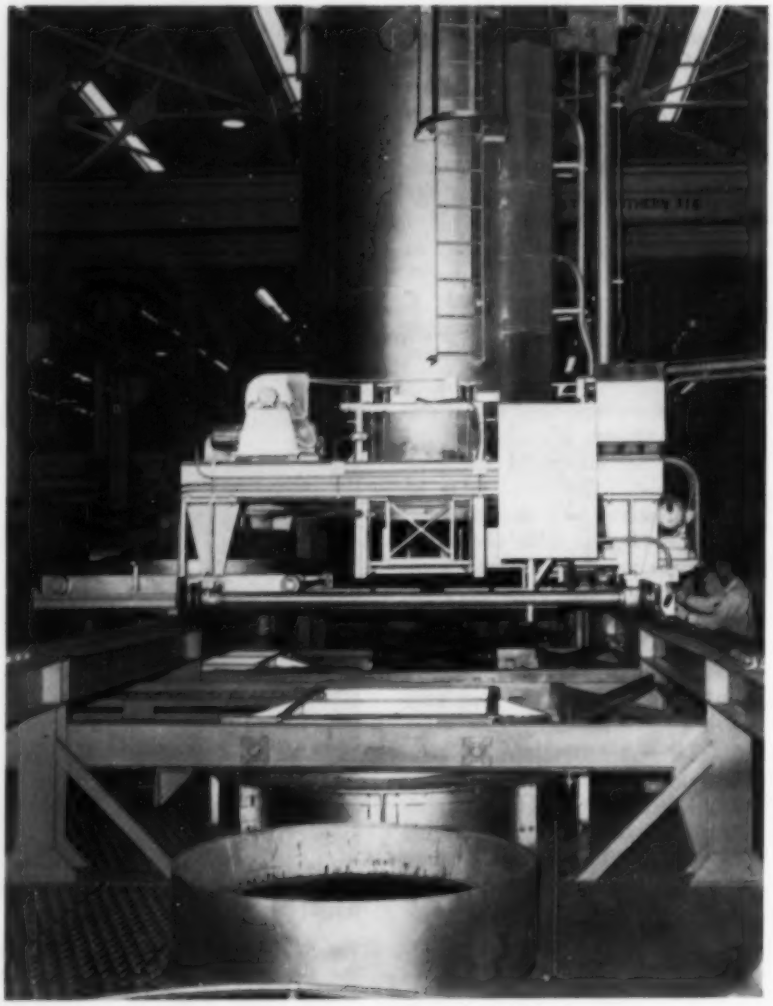



Fig. 3. Automobile instrument panel illustrates typical functions of visual information displays. Symmetrical grouping of similar dials produces a pattern in which any deviation from the mean is easily detected

**Douglas is heat treating steels to tensile strengths of 260,000 to 280,000 psi in a vertical electric furnace. Atmosphere control is the critical factor**

By L. M. STANTON
Supervisor, Materials & Process Eng.
Douglas Aircraft Co. Inc.
Torrance, Calif.



Douglas' movable hardening furnace on its rails

# Heat Treating Superstrength Steels

STEELS heat treated to the range of 260,000 to 280,000 psi, particularly 4340, are getting a lot of attention in the aircraft industry. Their high tensile strength gives them a strength-weight ratio above the strongest aluminum and commercial titanium alloys.

Machining this highly heat treated material is extremely difficult; grinding often produces cracks. Finish machining prior to heat treatment is necessary. To preserve the finish, furnace atmospheres must not be carburizing or decarburizing.

**Vertical Furnace** — To accommodate large parts made from superstrength steels, Douglas Aircraft, Torrance, Calif., has installed a vertical furnace with an exothermic gas generator. Built by General Electric Co., it is electrically heated.

The working zone is 4 ft in diameter and 10 ft high. Racked parts are raised into or lowered from the furnace by a chain. The furnace is on rails and moves over the oil quench tank for quenching or over either of two Lanly furnaces which can be used for preheating or tempering. Furnace capacity is 3500 lb of steel. The unit is equipped with three zone control temperature regulators,

one each for the top, middle and bottom zones.

**Atmosphere**—The exothermic gas generator (capacity 4000 cfh) draws fuel gas and air through visual flowmeters into a gas combustion controller where the air-gas ratio is regulated. The gas passes through a cooler and then through a carbon dioxide absorbing tower. The absorbing liquid is an aqueous solution of monoethanolamine of 12 to 15 per cent concentration.

From the monoethanolamine tower, the gas passes through a refrigerated gas cooler which lowers the dew point to about +40°F, and then to a regenerative type dryer which further lowers the dew point to about −40°F. From the dryer, the gas-air mixture goes directly to the furnace. A typical composition of gas entering the furnace is:

| | |
|---|---|
| Carbon dioxide | 0.0% |
| Oxygen | 0.0 |
| Carbon monoxide | 10.5 |
| Hydrogen | 15.5 |
| Methane | 1.0 |
| Nitrogen | 73.0 |

**Control**—Gas entering the furnace must be closely controlled to realize the maximum potential from the furnace. Since the primary purpose is to obtain parts free from decarburization or carburization, the factors to be considered in controlling the atmosphere are air-gas ratio, dew point and gas composition.

To establish these factors, test strips of the steels which were to be used in production were heat treated at various air-gas ratios and dew points. Samples of gas were withdrawn from the furnace during the heating cycle and analyzed.

**Tests** — Air-gas ratios were varied from 6:1 to 7:1. When the ratio became too low, carbon drop-out was experienced; when too high, the test strips were decarburized. It was found that an air-gas ratio of 6.3:1 was required for 0.40 per cent carbon steels. Dew points were taken at 10-minute intervals during the heating cycle with an Alnor dewpointer. It was found that a dew point of 24 ±4° F would protect the parts from carburization or decarburization.

After quenching in oil, test strips were chromium plated to preserve sharp edges and prepared for microscopic examination at magnifications of 100 and 300. When either carburization or decarburization was detected, adjustments were made in the air-gas ratio and the dew point. Oxygen and carbon dioxide were always held to 0.0 per cent.

To corroborate the microscopic examination, samples were tested for microhardness. In several instances, the microhardness tester uncovered decarburization not apparent under the microscope.

**Continuing Control**—The problem of atmosphere control is ever present. Gas samples must be taken periodically and analyzed for complete absence of oxygen and carbon dioxide. A dew point is taken as soon as a load enters the furnace and every 20 minutes thereafter.

Dew point adjustments are made by varying the quantities of dry gas (dew point −40°F) which enter the furnace. The air-gas ratio, once established, varies only slightly. Test strips are heat treated frequently, examined under the microscope and the findings confirmed with microhardness testing.

The experience of Douglas has been that atmospheres which are neutral toward high heat treat steels can be obtained with exothermic gas, but continuous control is a must.

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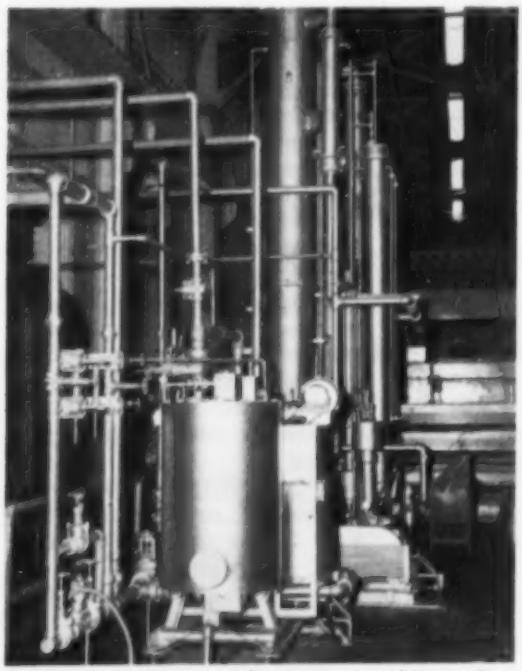
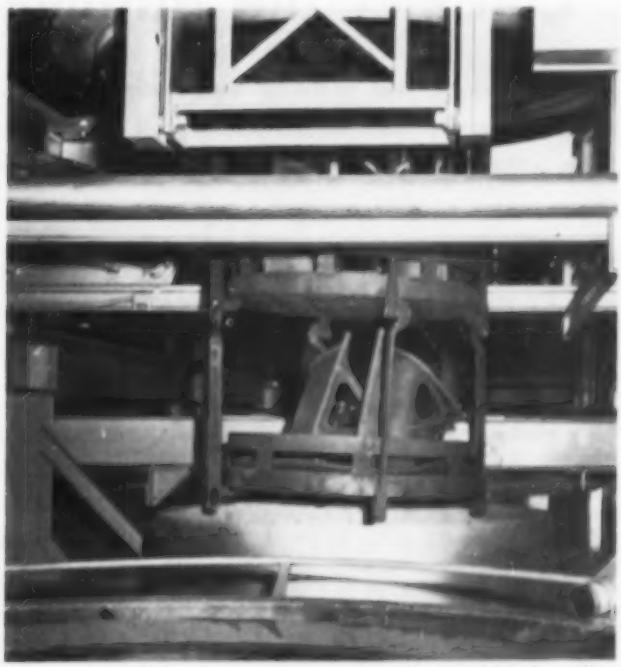
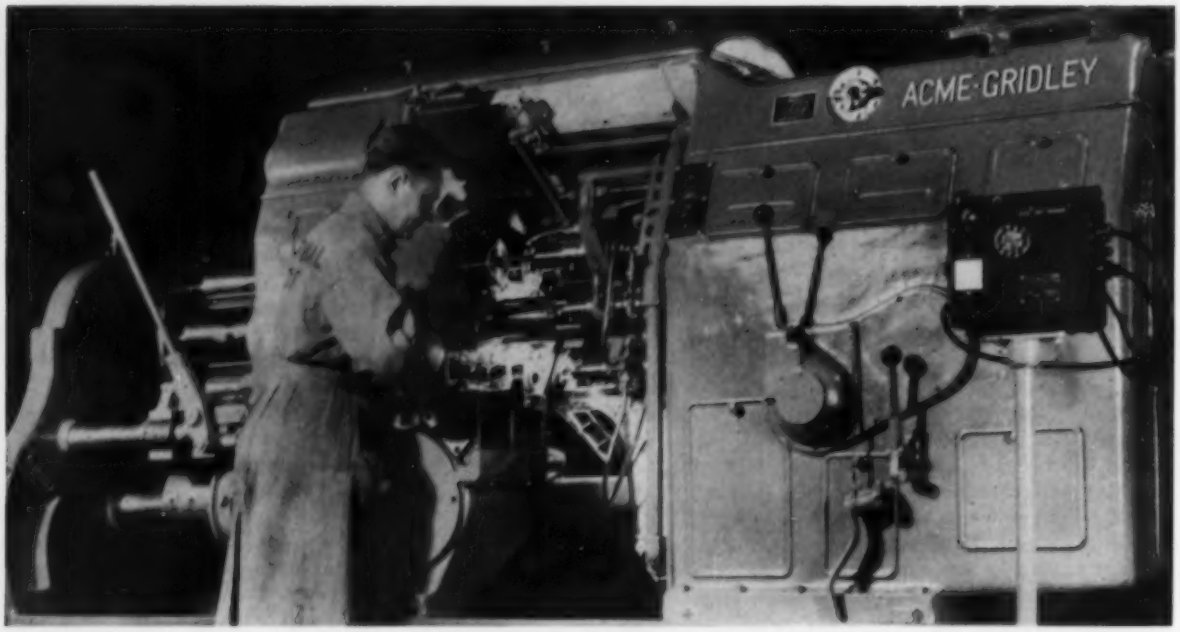
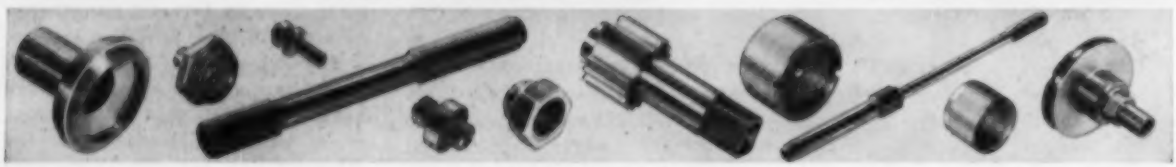


Exothermic generator and regenerative driers. Continuous atmosphere control is essential



Load of F4D Skyray crash barrier assemblies emerges from furnace after heat treatment



A typical six-spindle automatic screw machine. It's a standard, automated way to produce a bewildering variety of complex parts

# Consider the Automatics

**Don't overlook the familiar automatic screw machine. A natural for the automated factory, it has been improved. Here is the kind of performance you can expect from it today**

OPERATIONS like cutting, threading, turning and tapping are naturals for the old automatics. Today's machines also roll a thread, cold head a screw or bolt, crossdrill, crossmill or slot—all without removing the work from the primary machine.

Some 4-spindle machines will handle stock up to 8-in. in diameter; there are 8-spindle machines that even take 4-in. stock in stride. Only a year ago, spindle stops were limited to the 9/16 to 1¼-in. range. Today, they are available on all machines.

The automatic screw machine will be able to hold its own in the automated factory of tomorrow.

**Facts**—Classify the automatics like this:

1. Single spindle—Swiss, conventional.
2. Multiple spindle—two to eight spindles.
3. Chucking machines — standard bar machine, special modified.

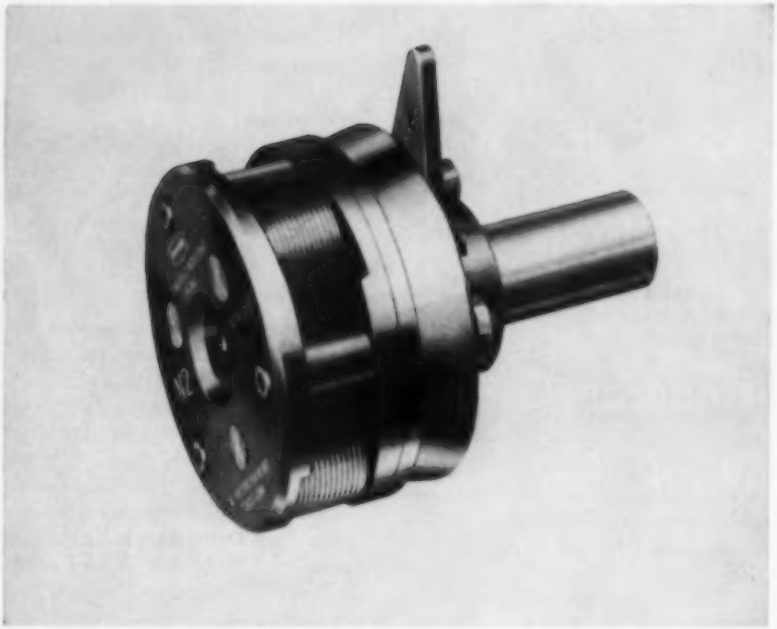
Swiss automatics are used for fine finishing of small, slender parts. Single spindles rapidly produce parts from bar stock fed through the spindle. Multiple spindles are used as bar and chucking machines. In chucking machines, the part is fed into the chuck which grips it automatically to carry it through the production cycle.

**Attachments**—Not long ago, a producer wanted to reduce the machining cost for the cross shaft of an automotive universal joint. Four re-chuckings were time consuming, so an air indexing chuck was invented. The part is held at the center of the cross. As the part progresses from one station to another, the next end is indexed for machining.

It is possible to produce two parts of an assembly simultaneously on one spindle from the same bar stock. (Example: A screw jack.) Both the base and the screw are machined in the same spindle. They can be assembled immediately after cutoff and deburring.

If your workpiece requires a cold heading, you don't have to remove it. There are some limitations, of course. High carbon steels won't take the upsetting that mild steel will.

An eastern maker of cold-headed parts uses this rule of thumb for low carbon steel, brass, copper



One type of self-opening, thread-rolling head. It makes accurate thread rolling possible on the primary machine

and aluminum: Don't try to upset more metal than is contained in a piece 4½-times the diameter of the stock you're using. Many shops won't consider cold heading more than 3½-times the diameter of the stock.

**Materials**—Any metal that can be cut with a tool can be machined on an automatic. There are materials that are too hard to machine economically, so tool wear and breakage must be considered from experience rather than by formula.

One Cleveland company machined titanium on an automatic with the same feeds, speeds and coolants it used for stainless steel—although tool wear was greater than it was with stainless. Titanium also can be thread rolled.

All the better known plastics—Vinylite, bakelite, nylon, phenolics, Lucite, Teflon, etc.—are run on

## Check List for Making Engineered Estimates

**Here are some points that should be considered by salesmen, agents, engineers and estimators**

**Specifications:**

- Are size and shape indicated?
- What is the finish—cold drawn or hot rolled?
- Does the part require special chemical or physical tests?
- What kind of testing?
  Will the customer accept a mill certificate?
- Will heat treatment be done in bar form or after machining?
  What will it do to the finish?
- Are number-specs (Chrysler, Ford, etc.) shown?
- What is stock length? (especially when customer supplies)
  If it's too short, loading time is increased
  If it's too long, it may require cutoff time
  Random lengths may cause spoiled parts
  Second operations require extra length for chucking
- What is the hardness of the material?
  If it's too soft or too hard, its machinability may be poor or tool wear may be excessive
- Will stock come from mill or warehouse? Check delivery time
- If customer furnishes stock, check f.o.b. point, price and delivery
- Who owns the scrap?

**Blueprints:**

- Are tolerances practical and properly specified?
  Watch concentricity notes
  Is extra handling required for critical, close tolerances?
- Do dimensions add up?
- Are sharp corners or radiuses called for?
  Allow undercuts for grinding fillets
- Cutoff—check for minimum width of blade
- Will burrs interfere with the next operation?
- Chips—allow time and cost for chip removal. Powders clog drains. Watch for stringy or gummy chips; they're harder to remove

**Finish:**

- Define plating specifications. Watch out for blind holes
- Does the customer object to collet, pusher or pull-off tool marks?
- Does the finish require special handling?
- Remember that sulphur-base cutting fluids discolor finishes

**Quality and Inspection:**

- Add cost of any salt spray tests
- Remember to check for nondestructive tests
- Is sampling O.K.? If so, have the acceptable quality level properly specified
- If customer requires 100-per-cent inspection, figure the cost carefully
- Be sure you agree with the customer on how both of you will measure the part. Show it on the blueprint
- Are the gages supplied by the customer? If not, do you have the types of gages he uses?
- The customer should furnish an approved sample

**Packing:**

- Figure the container cost
- Remember that special protection for threads, rust or sharp edges adds to the cost

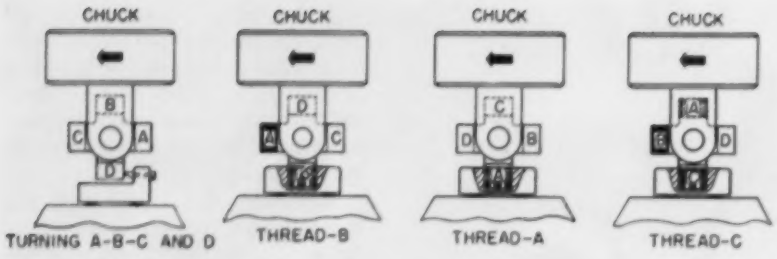
**Quantities and Delivery:**

- Is machine load tied in with routine production? Or will the customer's requirements throw additional burden on setup men?
- Compare the number of setups with the costs for a continuous run
- Allow lead time in the contract for mill or customer delivery of material
- What limitations are there on over or under runs?
- How many machines? Figure duplicate tooling costs
- Do you have a minimum run cost requirement?
- Have you included storage costs for split shipments?

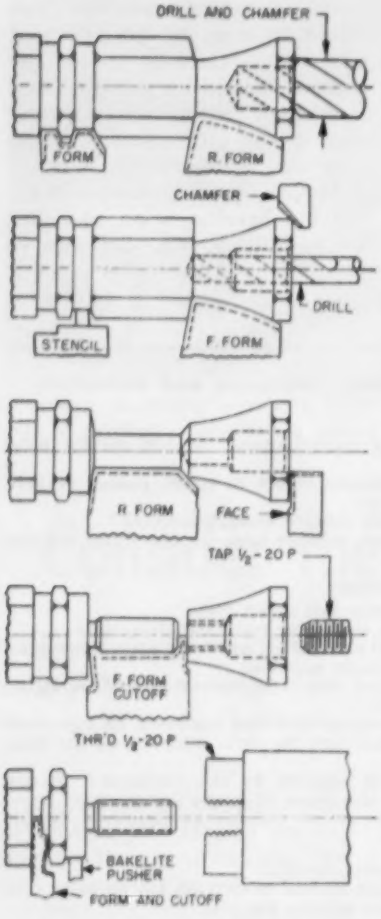
**Miscellaneous:**

- Help the customer eliminate unnecessary and tight dimensions, limits or tolerances

Source: Automatic Screw Machine Products Association




**This indexing chuck eliminates the need for separate chucking for four ends. A light pressure on the air control valve indexes the work within the chuck. All four ends can be machined without stopping the spindle**




**Two mating parts produced simultaneously from the same bar. Both base and screw form a screw jack**

screw machines. A survey of producers indicates that shop practices vary with the material.

One producer reports that one type of plastic produces gummy chips which increase cleaning costs. Another plant reports that Lucite bars are hard to hold in the collets, while another claims excellent results from threading, drilling and shaping.

The consensus is that the success you have with plastics will depend entirely on your skilled help.

Coolants? Water and deodorized kerosene are satisfactory for nylon and bakelite; another firm likes soluble oil for Vinylite and bakelite; most machinists prefer paraffin oil for Lucite.

**For Designers**—When you specify screw machine parts, don't forget these rules:

1. Cut threads can't be machined closer than two threads of a shoulder.
2. Deep blind holes require clearance for chips.
3. Make radiuses as large as possible. Those over 0.010-in. don't require additional operations.
4. Make fillets and corner breaks 0.010-in. or larger. Sharp corners are expensive and weak.
5. Specify cutoff burrs. Don't say "small cutoff burr permitted."
6. Fine surface finishes are expensive.
7. Design the product so that standard bars and shapes can be used. Investigate preshaped forms.
8. Avoid unnecessary horizontal shapes.
9. Avoid nonstandard threads and holes. Special tools run up costs.
10. Extraclose tolerances are expensive. Ordinarily, an automatic will produce 0.001-in.; in some cases, 0.005-in. Check the handbook; don't make them tighter than they need to be. Remember that diameters are easier to maintain than lengths.
11. Choose materials with maximum machinability. Metal suppliers have a variety. If one is unsuitable, there usually are acceptable substitutes.

**Remember**—The low cost of tooling makes fairly small production runs economical. A wide variety of machining operations is economical on forgings, castings and stampings when you use automatic chucking machines.

Production requires these considerations: 1. First-class maintenance. 2. Carefully designed, selected and sharpened cutting tools. 3. Good quality control procedures.

Close quality control requires air gages used once an hour—oftener if you're having tool trouble. Be sure that your floor inspectors sample one part from each spindle, and that their readings are charted and analyzed.

**Surfaces**—Tolerances for surface finishes are the most troublesome. It will help if you remember that multiple-spindle, bar automatics ordinarily produce finishes of 125 to 150 microinches rms. Turning tools, forming tools and drills are closer to 250. Special care will produce 60 microinches rms. If your specification calls for finer surfaces, separate operations like burnishing will be required. Occasionally, it is more profitable to have secondary operations like brushing or tumbling.

**Miscellaneous** — Tool rigidity can't be overemphasized. Loose and sloppy tools can't hold close tolerances.

Select feeds and speeds for the shortest possible cycle and as near equal tool life as possible.

Try to distribute work equally at each station. Overloading one will slow down all other stations.

Be careful how you apply cutting fluids. Careless direction spells the difference between long and short tool life.

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• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*

# What are your refractory castable problems ?

- High Temperatures?
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- Slag Attack?
- Overhead Applications?
- Insulating Properties Required?

B&W makes a wide range of specialized refractory castables. Whatever your problem, you will find helpful data in B&W Bulletin R-35. Send for your copy today.

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North runway. Miscellaneous sheet scrap is in foreground

Scrap pipe is prepared for shearing under the north runway

Coil ends are sheared to charging pan size on No. 3 shear

Domestic scrap is packed and strapped in forms at the source

# Preparing Scrap for the Open Hearth

**As open-hearth tonnages increase, better scrap preparation is needed, Vernon W. Jones of Armco Steel Corp., told the Philadelphia Section of AISE**

CONGESTION in the open-hearth stockyard at its Middletown, O., plant made it necessary for Armco to erect a scrap preparation yard to handle unprepared scrap (domestic and purchased). Open-hearth production had increased. The stockyard's hadn't.

The new yard covers 15 acres and has two crane runways, each 825 ft long. There are five 7½-ton overhead cranes, two on the north runway and three on the south. Under the runways are 16 alligator shears and a hydraulic bundler.

A 25-ton locomotive transfers scrap cars on the several tracks in the yard. A 40-ton diesel crane loads and unloads scrap outside the runways and dismantles scrapped locomotives and railroad cars. A track scale weighs inbound and outbound material.

**North Runway** — Trucks and cars bring miscellaneous No. 2 sheet scrap to the north runway where it is unloaded by overhead crane and sorted in heavy and light gages. Scrap that is too heavy for bundling is put on a separate pile, then resheared or burned to charging pan size.

The light gage No. 2 sheet scrap is loaded in cars and sent to the open hearth to be bundled. Enameled scrap is sheared on two No. 2 shears in the north runway. Four No. 2 shears are used for shearing scrap and pipe. Because this scrap must be handled by crane, these shears are in the middle of the runway.

**Pipe**—Scrap pipe is unloaded under the runway. Enough pipe is distributed on the ground to keep ahead of the burners. All pipe is cut to about 6-ft lengths; pipe over 6 in. in diameter must be split in

*Designers and Builders of Complete Steel Plants*

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**MESTA MACHINE COMPANY**

PITTSBURGH, PENNSYLVANIA

two or more pieces to get it under the shear blade.

Shearmen put the split pipe on the gravity conveyor ahead of the shear. Pipe must be sheared to 18 in. or under to get heavier weight per open-hearth charging pan.

**South Runway** — The Harris Bundler, four No. 3 shears and six No. 2 shears are operated under this runway. Trucks bring miscellaneous prepared scrap iron to this yard; when a carload is accumulated, it is sent to the stockyard.

Unprepared scrap is sheared on the No. 3 shears. It is sorted as much as possible when unloaded by magnet. Scrap which is too heavy for shearing is sent to an area in the center of the runway where it is cut with a burner to charging pan size. Space is reserved under the south runway for preparing current heavy material.

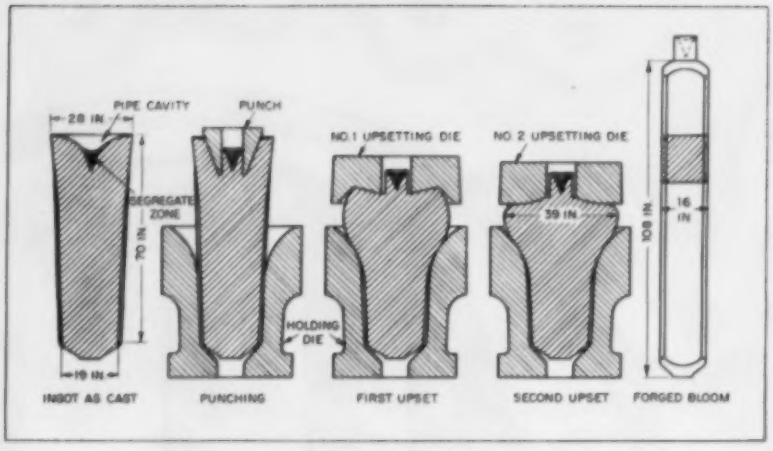
**Bundler** — Miscellaneous unprepared scrap is stocked ahead of the shears by crane. The shearman sorts out the undesirable nonferrous metals, cast iron and light-gage scrap. It is necessary for the shearman to handle every piece of scrap iron. Only a portion of this scrap has to be sheared to charging pan size.

Light-gage scrap, such as clips and used autos, are charged into the baler by crane. The unit produces bundles at the rate of 5 tons an hour. The bundles are 14 x 18 x 22 in. and weigh about 300 lb.

**Working Force** — Fifty-four men are required to operate the scrap preparation yard, one 8-hour turn five days a week. About 8300 net tons of scrap are burned, sheared, pressed or sorted for the mill each month. An average of 1.14 man-hours are required to prepare each ton of scrap.

The domestic scrap originating in the plant consists of bar crops, coil ends, sheet scrap, side and end shearings. The bar crops are extremely good scrap, but the other types must be prepared at the source or compressed into bundles.

Domestic scrap, when not subject to compressing, is packed and strapped in forms at the source and delivered to the stockyard. These bundles are 18 x 24 x 72 in. and average 3000 lb. Bundled sheet scrap is loaded into interplant trucks and sent to the stockyard.




*Isolated segregate zone and forged billet are reasons . . .*

# Dornin Process Pays Off

THE FIRST steel company to adopt the Dornin process likes the results, George A. Dornin Jr., son of the inventor, told the AISE at its spring meeting. He quoted from Green River Steel Corp.'s experience.

The Dornin process starts with a squat ingot with heavy taper to keep the pipe cavity shallow and the segregated zone concentrated. The hot ingot is charged into a press where a punching and two upsetting operations isolate the segregated zone (see drawing above). A bloom is forged from the upset ingot.

Green River, Owensboro, Ky., adopted the process to eliminate hot tops, to increase yield and to reduce rolling cost. After two years and 270,000 tons of production, these are the results:

**Out Ahead**—The company hasn't used a hot top since 1954. Only a relatively small increase in cost for cork insulation used on top of the ingot must be charged against hot top savings.

The ingot - to - shipped - product yield has shown an average monthly increase of 13 per cent. The yield for 1955 (carbon, alloy and aircraft steel) was 80 per cent. (The yield for the best month of hot top operation the company ever had was 67 per cent, and that was mostly carbon steel.)

**Rolling Down**—Ingots are still doubly converted, but differently. Now they are never allowed to cool between trips to the soaking pit. The effect is to relieve soaking pit congestion and reap the benefits of single conversion, such as lower heating costs and minimum grain growth.

The slender forging (with no taper and both ends convex for easy entrance into the mill) is an ideal shape for minimum rolling cost. With their small cross section, much heavier ingots than the pre-Dornin type can be rolled on Green River's equipment.

**Subtract**—Of course, there are new costs as well as savings in the forging-rolling cycle. Presswork adds about $3 a ton, but should drop much lower. Expense of hot scarfing the ingots must be counted. More soaking pits and forging presses to keep up with pouring and punching operations would increase efficiency.

But subtracting disadvantages from advantages, the result still makes the company happy. For sound ingots and a consistently high quality product, there's nothing like it, says Mr. Dornin. He cites as evidence: 4340 steel up to 14 in. square is consistently furnished with a transverse tensile of 260,000 to 280,000 psi and reduction in area of 13 per cent.

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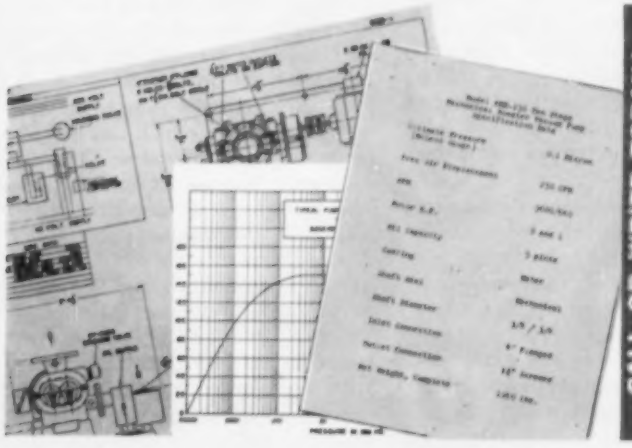

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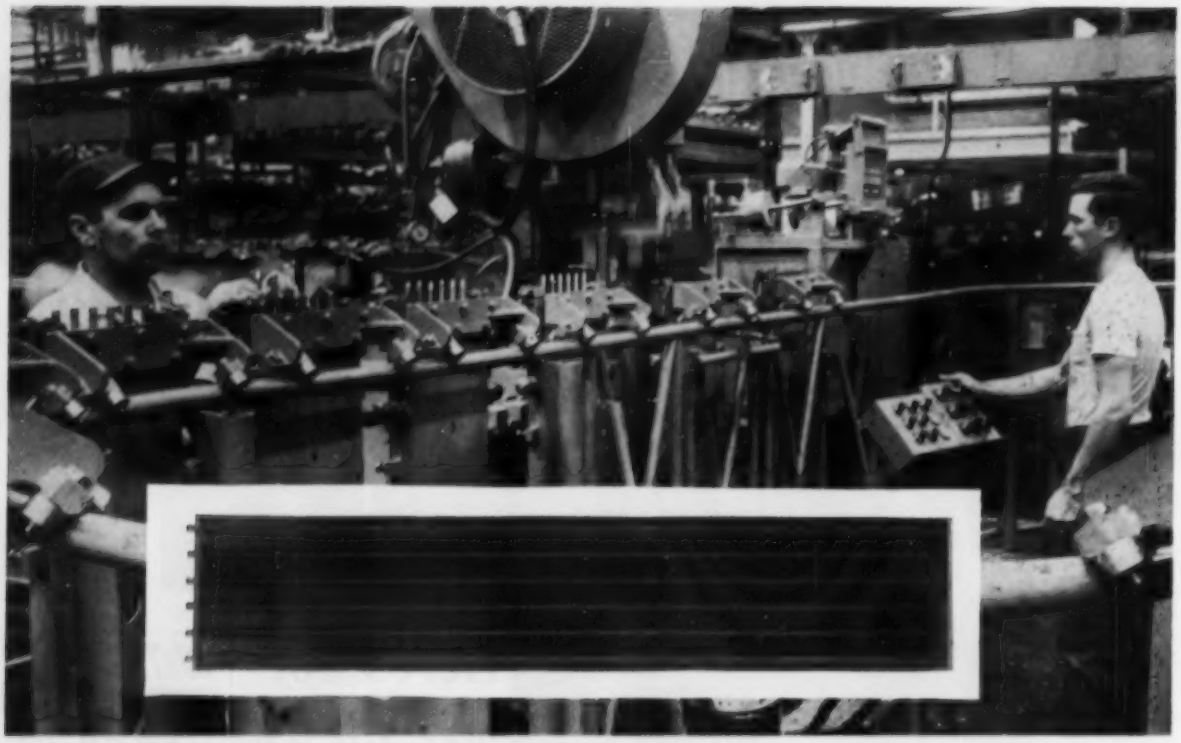

At Carrier Corp., Syracuse, N. Y., an operator loads tubes with bullet-nosed inserts into a fixture which will be automatically positioned under the Flexopress to receive stamped heating coil fins. The bullet noses guide the fins onto the tubes. Fixtures are adjustable for coils of various lengths. In the inset is a 52 in. coil of the type produced

# Where Stamping and Assembly Meet

PRODUCTION TIME on finned heating coils has been cut 60 per cent at Carrier Corp., Syracuse, N. Y., by combining high speed stamping and assembly. A 52-in. coil with 676 fins is completed every 2 minutes 6 seconds. Condenser and evaporator coils can be produced the same way.

Key element in the new method is a 30-ton precision Flexopress. It is fitted with a five station progressive die and a fixture that permits stacking fins 13 to the inch on tubes as part of the stamping operation. The fixture is adjustable for coils of varying lengths. Operation is completely automatic.

**Stamp, Stack**—The high speed stamping press turns out self-spacing aluminum fins at a rate up to 300 per minute and automatically places them on tubes held vertically in the fixture. Fixtures accommodate five different sizes of tubes (the largest is 52 in. long).

Formerly, fins were stamped, stacked or ganged and placed in nests. Tubes were inserted later. With the new method, tubes (capped with bullet-nose inserts) are loaded vertically in the fixture which locates and clamps them underneath the stamping die. The press immediately starts to stamp fins and stack them on the tubes. Flanged, extruded holes make the fins self-spacing.

**Count**—The machine automatically counts fins and stops when the proper number has been placed on the tubes. Then, the fixture automatically unclamps. The shuttling mechanism which removes the loaded fixture brings a new fixture with tubes into position to be loaded—and a new cycle starts.

A conveyor connects with the rest of the system where the coils have tubes expanded and return bends inserted, brazed and expanded.

**No Slop**—The press has a cast, high strength, light alloy ram guided by preloaded ball bearings. With rolling instead of sliding friction, there is no need for lubrication clearance on the slide.

"This eliminates ram float and shifting between punch and die—a major cause of die wear. It also runs cool, because of its antifriction qualities, and eliminates possibility of thermal misalignment," says a representative of the pressmaker, Precision Welder & Flexopress Corp., Cincinnati.

On the Carrier job, this has resulted in die life up to four times that experienced previously with the same type operation.

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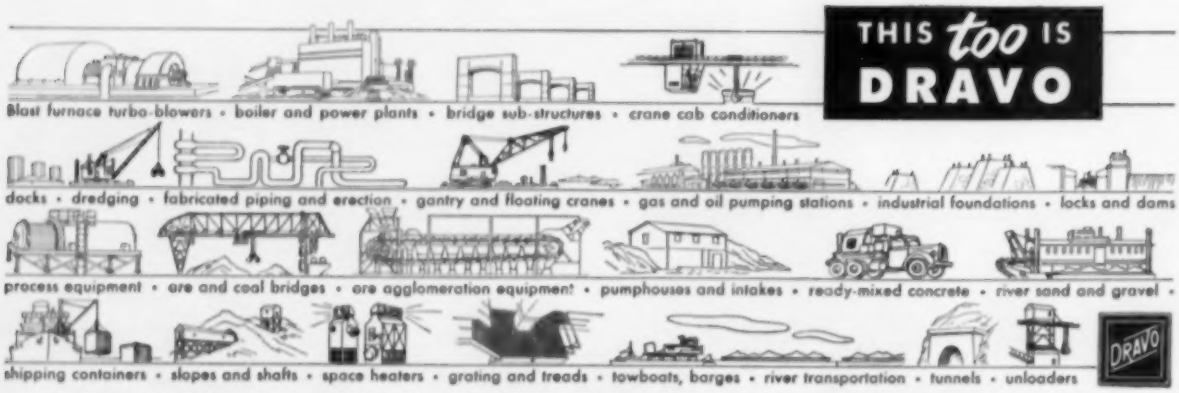
# TRI-LOK GRATING USED ON CLEVELAND-CLIFFS FLAGSHIP

The SS Edward B. Greene, new flagship of the Cleveland-Cliffs Iron Company ore fleet, was placed in service in the summer of 1952. Tri-Lok Open Steel Flooring and Stair Treads were used throughout the vessel including the engine room shown above.

Tri-Lok Grating is nationally distributed by Dravo Corporation. It is widely used for walkways, platforms, stairs and flooring. The method by which it is manufactured guarantees unusual strength.

In both marine and industrial applications, Tri-Lok Grating simplifies heating and ventilating because it permits air circulation. Dirt, dust, oil and grease accumulation is minimized, which saves cleaning and reduces accident hazard. This grating weighs considerably less than solid flooring which means lower costs of support and erection.

For over 60 years, Dravo Corporation has been serving business and industry in many fields. Dravo considers customer satisfaction an essential factor in all its products and services. DRAVO CORPORATION, PITTSBURGH, PENNA.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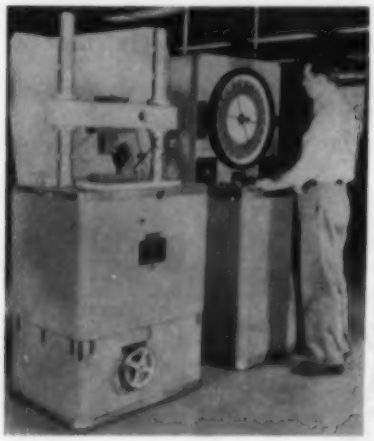
# Automated Testing

**Rubber engine mount testing is simplified by machine that cycles test loads automatically**

A DETROIT auto maker has taken automation one step farther—into his laboratory.

An all-electric testing machine, which automatically cycles tension and compression loads, lets the operator divide his attention among several types of tests or finish his test reports while the machine is operating.

**Cycle Test** — The photo below shows a rear mount for a truck engine going through a series of four load cycles. It is deflected 3/16-in. three times in compression to condition the rubber and then subjected to a 500-lb load.



TESTING UNIT
*. . . measures deflection under load*

This cycle test is followed by a shear test in another position with three deflections of 0.5-in. and then a load of 500 lb. The specimen is strained and relieved at the rate of ⅛-in. a minute. This makes the time for both tests about an hour.

**Test Machine**—The Baldwin SR-4 test unit has a capacity of 50,000 lb. Loading is measured and controlled by load cells which are based on the electrical principle of the bonded resistance wire strain gage.

Strain cycles are controlled by limit switches on platen movement. These switches reverse the direction of the electric motor drive of the machine. Movement is read on a dial indicator.

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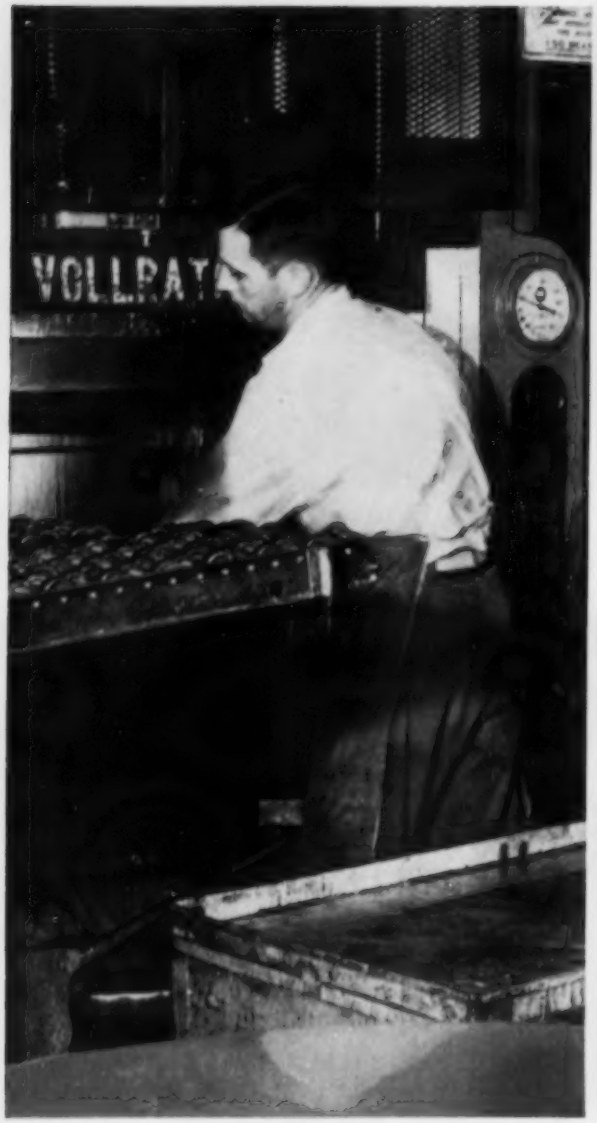
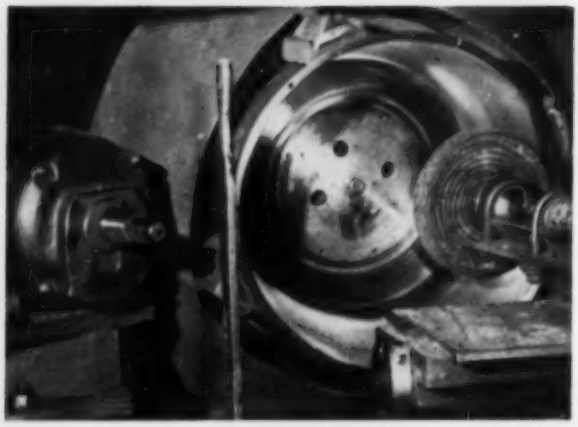
# Here's proof of ENDURO'S





*Above*—After deep drawing, tub is polished, buffed and ready for shipment.

*Left*—In a single operation, a circular steel blank is drawn into a tub. This is a 50% reduction.

*Below*—Installed in the Speed Queen Automatic Washer, the stainless tub adds sales appeal, will last a lifetime.

# REPUBLIC

REPUBLIC STEEL

*World's Widest Range of Standard Steels*

# ductility . . .

## Vollrath makes stainless steel washer tub in one deep draw

The Vollrath Company, Sheboygan, Wisconsin, makes a quality line of special stainless steel products for many industries including chemical, dairy, food processing and appliance.

One of the most interesting products, from a fabricating standpoint, is a stainless steel washer tub made for the Speed Queen Automatic Washer.

Vollrath craftsmen start with a circular blank of Republic ENDURO Stainless Steel, Type 430. Then, in a single operation, they draw the blank into a tub. What makes it unusual is the extremely deep draw in which the diameter of the blank is reduced 50%. This is proof of ENDURO's ductility.

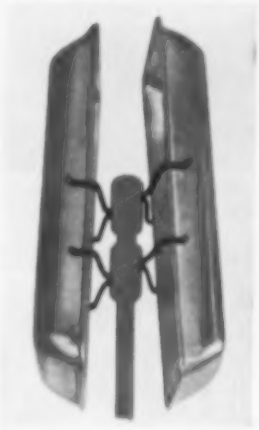
But, uniform ductility is only one advantage of ENDURO. It offers a combination of mechanical, heat-resisting and corrosion-resisting properties that no other commercial metal can match. And it is not difficult to fabricate, just different.

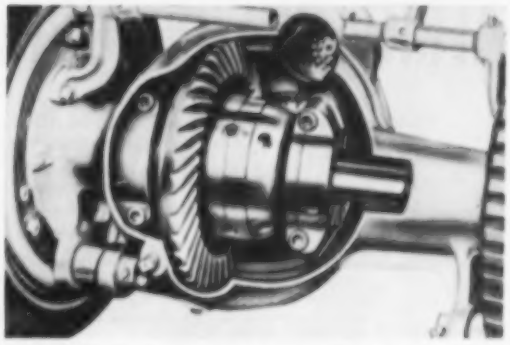
Republic produces ENDURO Stainless and heat-resisting steels in bars, slabs and billets, forging blanks, cold drawn shapes, plates, sheets, strip, tubing, tube rounds, wire and welding rod.

Our metallurgists and machining specialists will help you apply ENDURO to your product or process. There's no obligation. Mail the coupon if you would like one to call at your plant.

**HERE'S PROOF OF MACHINABILITY** — This spiral milled shaft is the heart of a ratchet-type screw driver. It bears the full load of the twisting operation. Excellent machinability of Republic Cold Drawn Steel helps the manufacturer achieve uniform high quality in each shaft. Cold drawing provides additional benefits in improved physical properties.

**HERE'S PROOF OF CORROSION-RESISTANCE** — A producer of ice trays and grids increased anodizing rack life 100 times by switching from aluminum to Republic Titanium. Its stubborn resistance to most forms of chemical attack, and total resistance to salt water make Republic Titanium an economical long-term investment. Investigate Republic Titanium for your parts that must withstand severe service.





**HERE'S PROOF OF STRENGTH AND TOUGHNESS** — This axle performs double duty. It drives a lift truck and bears the full weight of whatever is being lifted, including loads up to 100,000 pounds. By taking full advantage of Republic Alloy Steel's superior strength and resistance to fatigue, shock and stress, the manufacturer insures safety, extends equipment life, cuts maintenance and replacement costs.

**REPUBLIC STEEL CORPORATION**
**Dept. C-2060**
**3120 East 45th Street • Cleveland 27, Ohio**

☐ Have a stainless steel metallurgist call.

Send more information on:

☐ ENDURO® Stainless Steel ☐ Cold Drawn Steels
☐ Titanium ☐ Alloy Steels

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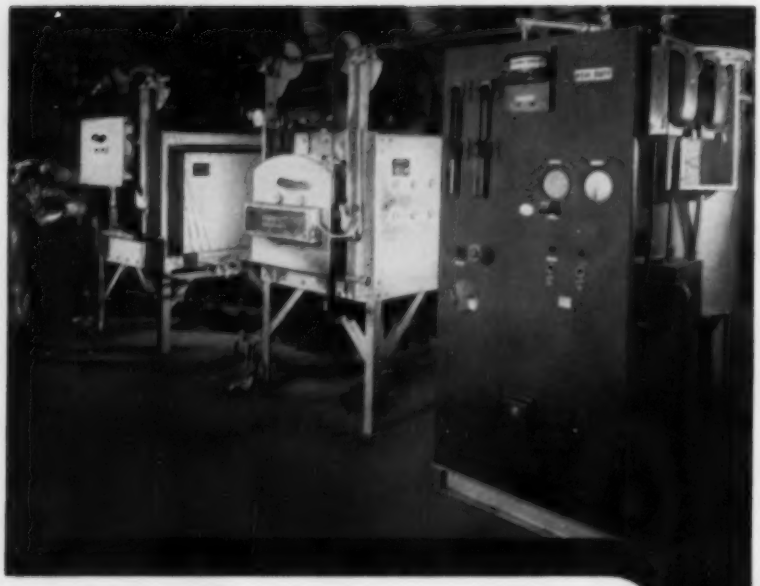
# STEEL

*and Steel Products*



Tools and Dies
Heat Treated in...

HEVI DUTY Controlled
ATMOSPHERE FURNACES

Allis-Chalmers of Milwaukee is using Hevi Duty Controlled Atmosphere Furnaces to heat treat tools and dies made from high carbon, high chrome steels, 18-4-1, molybdenum, and cobalt high speed steels. Maintaining the exact surface carbon content of the tools and dies during heat treating is achieved with —

- A Hevi Duty Endothermic Atmosphere Generator supplying 500 cubic feet per hour of prepared atmosphere. With this controlled atmosphere, troublesome scale and decarburization or carburization of the surface is eliminated.
- A Hevi Duty Box Type Hardening Furnace, designed for temperatures to 2000° F., is used for preheating high speed steels and hardening carbon steels.
- A Hevi Duty High Temperature Furnace, designed for temperatures to 2600° F., is used to harden the high speed steels.

This combination assures you that tools and dies can be treated to exact hardness. Achieve better heat treating results by specifying Hevi Duty Furnaces. Write for Bulletin 153.

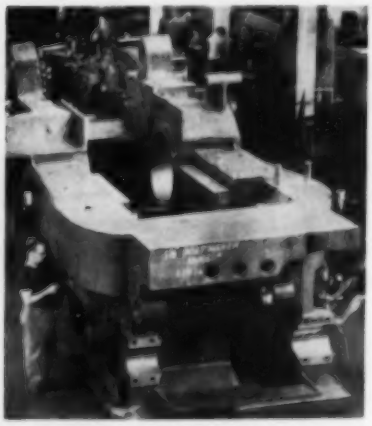
HEVI DUTY ELECTRIC COMPANY
MILWAUKEE 1, WISCONSIN
Heat Treating Furnaces... Electric Exclusively
Dry Type Transformers Constant Current Regulators

# Large Cold Header

ONE of the biggest cold forging machines ever designed is being built for the Cleveland Cap Screw Co., Cleveland. Weighing 196 tons, it stands twice as high as a man and uses a ton of 1 7/16-in. steel rod every 10 minutes.

The product: Giant capscrews 1¼-in. in diameter, 10 in. long. Each one weighs 5 lb.

**Process** — The boltmaker uses the Kaufman, double extrusion process developed by Cleveland Cap Screw. A coil is placed in the machine, drawn to size, cut and extruded into a blank. The boltmaker then forms the head, trims it, points the end and rolls the threads. All operations are automatic. In addition, the machine will be equipped with electronic variable speed controls.



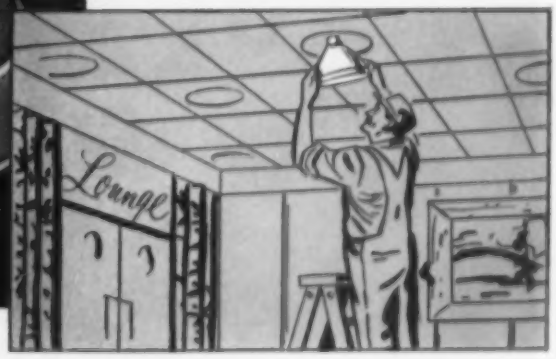
BEHEMOTH BOLTMAKER
*. . . will make forty 1¼ by 10 inchers a minute*

Three men will operate it. One will be stationed at the wire drawing end to control the 2800-lb coils of steel rod. The second will operate the conventional mid-machine post. The third will stand at the thread rolling end.

**Others**—After installation (expected in late 1956), the machine may be tooled to produce even larger bolts. It also will be used to produce large special products other than fasteners.

The boltmaker has 1800 parts, a 150-horsepower motor and is equipped with its own lubricating and cutting oil systems. It is being constructed in Tiffin, O., by the National Machinery Co.

# Our challenge stands




## —anything that can be made of steel sheets can be made of

**WHEELING**

**SOFTITE®**

**Galvanized Sheets**

Believe it or not, this galvanized recessed ceiling light reflector housing was made by spinning. *"Impossible,"* you say? *"Can't be done with ordinary galvanized steel"?*

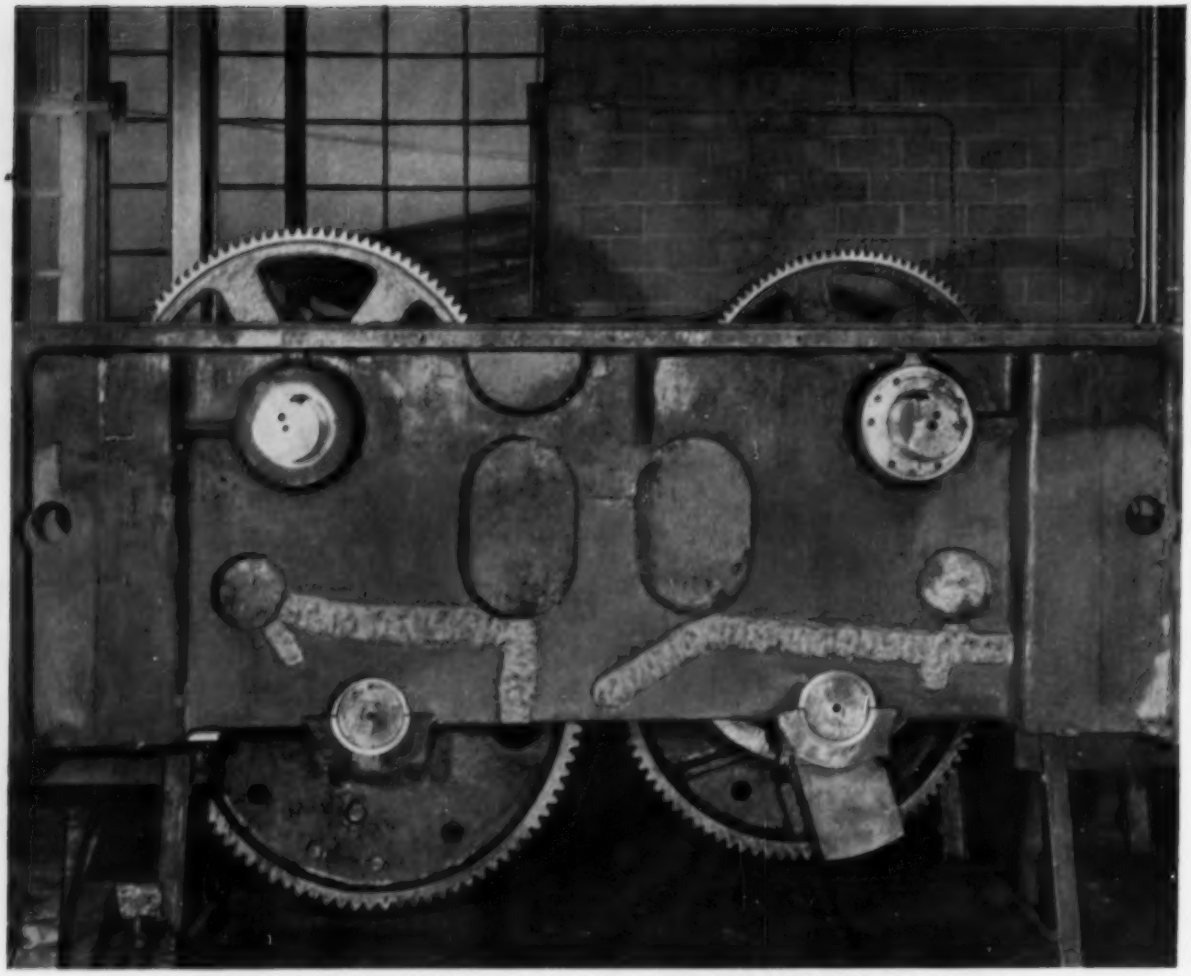
You are right! It *isn't* made of ordinary galvanized steel.

It's made of Wheeling SOFTITE, the tightest-coated galvanized sheet yet produced. So tight it won't chip, crack, flake or peel no matter how severely it is formed. It even takes *spinning* in its stride. In fact, *anything* that can be made of steel sheets can be made of Wheeling SOFTITE.

*That's* SOFTITE . . . made by the same company that developed Cop-R-Loy, the original copper-bearing steel pipe . . . and DUCTILITE, the original cold reduced tin plate. Now SOFTITE, the ultimate in ductile, tight-coated galvanized steel sheets . . . a product of Wheeling Steel Corporation, Wheeling, West Virginia.

# IT'S WHEELING STEEL

**District Offices** — Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Houston, New York, Philadelphia, St. Louis, San Francisco



Two of the braze welds made in this big press crown with ANACONDA-997 (Low Fuming) Bronze Rod. All four cast-iron partitions in the crown were repaired.

# After other repairs failed, Braze Welding with Anaconda Rod restored this iron press crown

When this 16-ton crown of a double-action press first failed, it was repaired by electric arc-welding using a high-strength nonferrous electrode. This joint failed.

The Punch Press Repair Corporation of Ferndale, Mich., cut out the old welds and braze welded all four of the cast-iron partitions in the crown, using a total of 800 pounds of ⅜" ANACONDA-997 (Low Fuming) Bronze Welding Rod.

Its useful life extended, the press is back in active service at the plant of a large tool and die firm in Detroit.

ANACONDA-997 (Low Fuming) Bronze is a superior welding rod used to join gray and malleable cast iron, steel, and copper alloys by the oxyacetylene process. It is one of a broad line of Anaconda Welding Rods that are finding increasing applications in production and repair welding. Anaconda Welding Rods are sold by distributors of welding equipment everywhere.

See your Anaconda distributor or write: The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

**ANACONDA® WELDING RODS**

***Sold by distributors of welding equipment everywhere***

Operator feeds sheet stock into a die that fabricates tube. U-shape formed in first stage is automatically transferred by mandrels to the second stage where the tube is finish rounded

# Tight Space Forces Efficiency

## Designing a production line for making steel tubing in short lengths, engineers at Detroit Division, Dana Corp., found cramped quarters proved a help

LACK OF SPACE in a factory may turn out to be a blessing in disguise.

"We found this to be true at the Detroit Division of the Dana Corp.," says Harry G. Schultz, vice president and general manager. "We were challenged to devise an efficient, if slightly unorthodox, method of producing steel tubing in short lengths."

This fabricator of passenger-car chassis frames ran into a need for tubular crossmembers. Production schedules called for 2000 a day.

**Tight Squeeze**—With plant space almost completely used up by machines and equipment, no room was available for a conventional tube mill, says Mr. Schultz.

"Nor could we justify the cost of one.

"The only way we could get the crossmembers would be to buy them from an outside source—unless we could develop an unusual means of making the tube.

"In probing the possibility of having the tubing fabricated for us, we learned the price would be prohibitive. Pennies in the automotive part industry often are more vital than dollars in other businesses. Far too many extra pennies were involved in this instance."

**Step by Step**—"First," says Mr. Schultz, "we designed special tools to form straight tubing out of black sheet steel of the most economical width (36 to 48 in.). Along with this, we developed a submerged arc technique for welding the tube seams."

Here's how tubes are made with the system which was designed from stem to stern by the division's personnel:

A multiple width sheet of steel (from which they get seven tubes) is fed manually into a two-stage transfer die. In the first operation, the dies form the U-shape. The part is transferred automatically to the second stage where the U-shaped section is formed over mandrels into a tube. The mandrels are automatically inserted and withdrawn.

**Clean, Weld**—Coming out of this forming process, the tubes are put in racks and moved to the assembly area. They are manually loaded into a hopper that feeds an automatic washer.

After being washed, the tubes feed into a submerged arc welding machine, the line bottleneck. This machine runs continuously.

**Automation, Almost** — Tubes coming off the welder drop into a temporary storage rack, are manually loaded into a forming die, then are ejected into a storage rack behind the press. At this forming die, the tube, straight up to this point, is bent to its final shape. A re-strike operation for sizing follows.

Parts then go through an automatic drilling machine and onto a slat conveyor that takes them to assembly operations.

**One-Man Job**—Mr. Schultz says: "With the different stations in our tube fabrication layout so close to each other, one man can readily service the entire group."

His job has three parts. First, he removes the tubes from the rack at the washer-loading station and puts them into the hopper.

Second, he shifts to the forming press and runs the tubes from the storage rack at the eject end of

ATKINS C 614 P
SILVER STEEL HIGH SPEED
TUNGSTEN MADE IN U.S.A.
Chamfer tooth PAT. NO. 2,637,355
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SILVER STEEL WELDED EDGE
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PAT. NO. 2,637,355
ATKINS CMS 614 P
SILVER STEEL SOLID
MOLYBDENUM HIGH SPEED
Chamfer tooth MADE IN U.S.A.
PAT. NO. 2,637,355

## THE NEW

# ATKINS Chamfer tooth hacksaw blade

- **CUTS SMOOTH**
- **CUTS STRAIGHT**
- **MORE CUTS PER BLADE**

**HIGH-SPEED TUNGSTEN**
For fast, efficient cutting of hard-to-machine materials—tough steels with "work-hardening" tendencies—for cutting highly abrasive materials, these long-lasting blades are your best answer.

**SOLID MOLYBDENUM**
Atkins metallurgy, heat treatment and the new Chamfer Tooth make these blades ideal for economical, all 'round cutting of ferrous and non-ferrous metals.

**WELDED-EDGE MOLYBDENUM**
A shatter-proof hacksaw blade with a high-speed Molybdenum Chamfer Tooth cutting edge that combines increased production life with greater safety for general all-purpose cutting—both ferrous and non-ferrous.

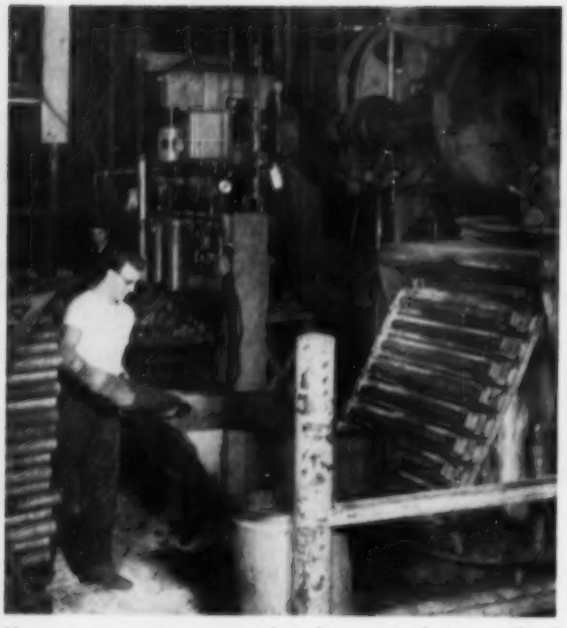
ATKINS Silver Steel SAWS

another B-W product

**ATKINS SAW DIVISION • BORG-WARNER CORPORATION**
**INDIANAPOLIS 9, INDIANA**

BRANCHES: Chicago • Philadelphia • Los Angeles • Chattanooga • Portland, Ore.

1856—ONE HUNDRED YEARS OF SAW EXPERIENCE—1956



Here an operator moves tubes from a rack into a load hopper that feeds an automatic washer. Tubes move automatically through the washer and a seamwelder

From the seamwelder tubes are ejected into the bin at lower left. An operator then puts the welded straight tubes into a forming die

Formed tubes fall into the bin at lower right. The operator moves them into the restrike die. They're then ejected onto arms

Operator moves tube from arms at restrike press into the drilling machine. Tubes are automatically ejected. A slat conveyor carries them to assembly points

the welder through the forming press.

Third, he goes behind the forming press and runs the tubes through the re-strike operation and drilling machine. Mr. Schultz is sure the man is no busier than most machine operators.

**Credits**—Mr. Schultz says the new system was a group effort in every respect—one of close co-operation among plant engineering, equipment engineering, standards and other departments.

Through it, he says: "A myriad of accomplishments have been realized. Among them are the elimination of the need for purchasing tubular members from the outside and the savings in initial cost of a conventional tube mill."

Because they were forced to conserve floor space in locating the machinery, engineers eliminated manual handling between stages and set up a one-man operation.

Mr. Schultz comments: "Although some might call this a Rube Goldberg operation, we are getting maximum efficiency from it, along with as good a product as could be obtained with fabrication by other methods.

"We're sort of glad space ran out on us. If we had been able to disperse the operation, we probably would have done so. We feel it wouldn't be nearly so efficient as what we're using."

US Sand Blast Hose

# Dissipates Static Electricity as no other hose can!

Blasting with either sand or steel shot can build up a static electrical discharge so potent that the operator cannot handle the hose. In extreme cases the hose wall may even be perforated by this man-made form of lightning. An exclusive construction makes U. S. Sand Blast Hose *conductive*—and (more thoroughly than any other hose) prevents static build-up.

The strong carcass is built to handle any required pressures—is rigid enough to hold its shape, yet is always flexible for easy handling. High-grade rubber cover resists abrasion. Tube has the high abrasion resistance so essential in steel and shot blasting.

Obtainable at any of the 28 strategically located "U. S." District Sales Offices, or write Mechanical Goods Division, United States Rubber, Rockefeller Center, New York 20, New York.

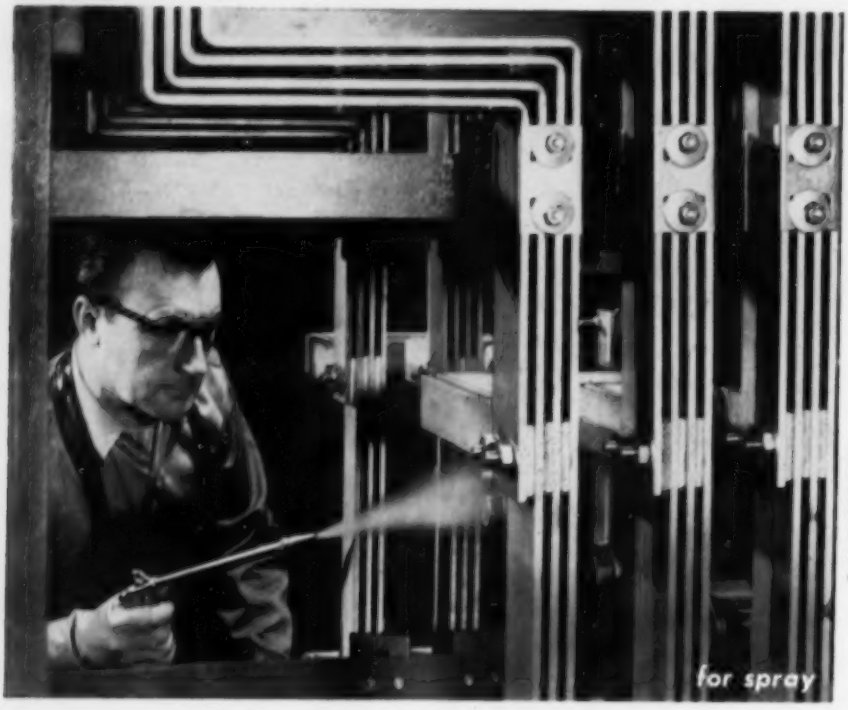
US RUBBER

Mechanical Goods Division

**United States Rubber**

*Dow . . . industry's most complete line of chlorinated solvents*

DOW




**Safer.** Lower toxicity and lower fire hazard make Chlorothene much safer for spray applications than other commonly known solvents. Chlorothene has an MAC rating of 500 ppm—20 times greater than carbon tet!

# Better solvent action for cold degreasing with versatile, safer

# CHLOROTHENE

Chlorothene® (Dow 1, 1, 1—Trichloroethane, Inhibited) is sold exclusively by your Dow distributor. He's also the man who supplies DOW TRICHLOROETHYLENE, DOW PERCHLOROETHYLENE and DOW METHYLENE CHLORIDE for vapor degreasing and other specialized cleaning operations. Write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. S941B-1 for more information.

**Less Corrosion.** Chlorothene quickly cuts greases, oils, tars, waxes and the most stubborn contaminants. Highly stabilized, it has extremely low corrosive effects on all common metals.

**Versatile.** A product of many uses, Chlorothene is described by enthusiastic users as "the best general-purpose cold degreaser . . . by far the safest and the easiest to use!"

**Fast.** Chlorothene cleans faster, more thoroughly—poses no skin absorption problem. Its topical effect is similar to that of other good organic solvents.

*you can depend on DOW SOLVENTS* DOW

**Grinders Add Final Touch**

Hardened ways are finished satisfactorily only by grinding. A battery of Mattison grinders like this one is used by the Ohio Knife Co., Cincinnati, to grind ways, centerless grinder blades, cutting tool and straightedges

## Machine Bolt or Capscrew?

A machine bolt's function is the same as a capscrew's, although they vary markedly in their use, explains Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

A machine bolt at one time was known as a rough product because it was hot forged. A capscrew was regarded as a finished product because it was made on a screw machine. Now, both products are made on cold-upsetting machines.

**Advantages**—Cold heading produces better bolts and capscrews; it requires better material, and the process flows the material into a strong, shock-resisting head.

Formerly, threads were cut with chasers. Cold forming produces a better thread form, accurate lead, smooth surface and good structure at the thread roots.

**Applications** — Capscrews are used when products require a higher quality or more finished appearance than machine bolts give. Capscrews are held to closer tolerances, are given a semifinished bearing surface and are machine pointed.

Capscrews are carried in distributor stocks with hex head and without nuts, both bright and heat treated in coarse or fine thread. Machine bolts are carried with square heads and square or hexagon nuts, in coarse thread only. They are made and stocked over a much wider range of diameters and lengths than capscrews.


# How Biggest Toy Maker of West Cuts Seasonal-Change Costs With Flexible Plant Layout

To meet ever-changing production and tooling requirements, Mattel, Inc., uses Leveling Barry Mounts to mobilize its 22 open-back inclinable punch presses ranging from 10- to 60-ton capacity. Now the entire press-room layout is revised whenever the product line changes — because all 22 presses can be relocated in less than a day by three men and an industrial truck. The result — smoother flow of materials, less handling between operations, simplified expansion of press department, easier maintenance, and reduction of noise and vibration transmitted to other parts of the building. Mattel says, "Our Barry Mounts have paid off their investment several times over".

*Ask Barry how YOU can boost output by mobilizing machinery.*

## ATF Proves Barry Mounts Cure Vibration Troubles in Testing Precision Gears

The gages on sensitive gear checkers at American Type Founders went crazy when lift trucks rolled by, and other machines sent vibrations down columns or through walls and floors. But now, with the testers "floating" on Leveling Barry Mounts, gear checking continues without interruption under the worst vibration conditions. For machine tools also, ATF has proved Barry Mounts make it easier to hold close tolerances and to get higher operating speeds by keeping vibration from affecting feeds, cutting tools, or work.

*Ask Barry how YOU can protect precision machinery.*

## Here's How YOU Can Gain These Advantages

Write for our plant survey booklet M-556 that tells you where to look for these kinds of savings in your plant; then talk over your machine-mobility needs and vibration problems with a Barry representative or Barry Mount distributor.

BARRY CONTROLS INCORPORATED

BARRY B MOUNT

SOLD THRU INDUSTRIAL DISTRIBUTORS

926 PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS

# World's

BATTERY OF CLEAVER-BROOKS EVAPORATORS IN ACTION—Revere Silicon Bronze was chosen for these evaporators and their component parts because of its high corrosion resistance and non-contamination properties, great strength and weldability. All of the components, as well as the 4 evaporator shells, are made of Revere Silicon Bronze Alloy No. 420.

ONE OF THE 4 EVAPORATOR SHELLS made of Revere Silicon Bronze, fabricated and installed by CLEAVER-BROOKS MFG. CORP., Waukesha, Wisconsin.

EIGHT TUBE SHEETS LIKE THESE were used in the Bermuda installation . . . 2 per evaporator. Each tube sheet, made of Revere Silicon Bronze, is 86" in diameter, 1¼" thick and weighed approximately 1,360 lbs. after drilling.

# Largest

## VAPOR-COMPRESSION SEA WATER DISTILLATION PLANT

### *Made and installed by* CLEAVER-BROOKS

### *. . . Vital distillation units fabricated from* REVERE SILICON BRONZE

This plant installed at the Kindley Air Force Base in Bermuda has a total daily capacity of 200,000 gallons and eliminates the dependence of the Base on rainfall or shipment of water by tankers.

Distilled water is produced in the ratio of 300 lbs. to each pound of Diesel fuel. Total costs are estimated at $1.25 per thousand gallons of distilled water. Nearly every component part made by Cleaver-Brooks is about twice the size of its largest previous counterpart. For example, the evaporators are 16½ feet high. Each, with its component parts, weighs approximately 40,000 lbs., the empty Revere Silicon Bronze shell alone accounting for 28,000 lbs.

There is an interesting story behind the development and manufacture of this equipment. The four huge pressure vessels had to be fabricated of Revere Silicon Bronze Alloy No. 420. Knowing Revere's wide experience in welding copper-base alloys, Cleaver-Brooks called in a Technical Advisor, and gave him a complete set of blueprints of the vessels, with a request for suggestions regarding joint design and welding techniques. He in turn consulted the Welding Section of the Revere Research Department. Their recommendations were adopted, and the customer reported that the original estimate of welding time had been cut considerably, reducing production costs correspondingly.

The Revere Technical Advisory Service is glad to collaborate on problems involving the specification and fabrication of copper and copper-base alloys, and aluminum alloys. See the nearest Revere Sales Office.

**REVERE COPPER AND BRASS INCORPORATED**

*Founded by Paul Revere in 1801*

230 Park Avenue, New York 17, N. Y.

*Mills: Baltimore, Md.; Brooklyn, N. Y.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Newport, Ark.; Rome, N. Y. Sales Offices in Principal Cities, Distributors Everywhere.*

COPPER • BRASS • 18 01 • REVERE • ALUMINUM

**THE STEAM SEPARATORS are identified by their conical tops and directional vanes. They are of the cyclone type, which is a patented feature of CLEAVER-BROOKS evaporators, and remove entrained water from the steam, thus preventing contamination of the fresh water coming from this unit. The result is an extremely high purity of the fresh water product.**

**The rectangular objects at rear of photograph are the "Downcomers" which bring water down from the top of the steam separator. The tubes in left foreground are "Hotwells," which receive the distilled water discharge from the evaporator shell.**

# Practical Idea for the Production Man

Efficient electric hoists...to move materials overhead and release floor space for more valuable operations.

CM HOISTS

**CM LODESTAR ELECTRIC CHAIN HOIST**
⅛ to 1 ton capacities—First truly heavy duty version of small electric hoist. ⅛ ton model weighs only 51 lbs. Heavy duty self-adjusting brake. Upper-lower safety limit switches. CM-Alloy load chain.

**CM METEOR ELECTRIC WIRE ROPE HOIST**
½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

Good Suggestion for the Maintenance Man!

Rugged lightweight hand hoists and pullers...to make your job easier and safer

**CM CYCLONE HAND HOIST**
½ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

**CM PULLER THE "ONE MAN GANG"**
¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation. Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds. CM-Alloy flexible load chain.

ALSO... CM Trolleys and Cranes

WRITE OR WIRE FOR COMPLETE CATALOG AND NAME OF YOUR LOCAL DISTRIBUTOR

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# Furnace Melts Dies

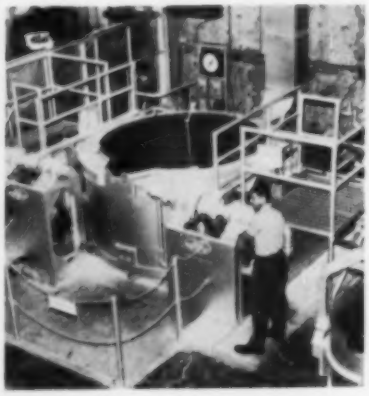
**Nose-tilting furnace will melt large Kirksite dies for a west coast aircraft maker**

A NOSE-TILTING melting furnace for Kirksite dies will save a west coast aircraft company 6½-cents on every pound of the die material it melts. That's the difference between scrap value and the cost of new Kirksite.

Built by Bellevue Industrial Furnace Co., Detroit, the furnace has a 25,000-lb capacity. It's 76 in. in diameter, 37 in. deep.

**Simple Construction**—The nose-tilting feature eliminates the need for a deep pit. The ladle rests on the same level as the furnace.

The furnace is big enough to remelt large obsolete dies without requiring that they be cut up. An 18,000-lb die was melted in 3½-hours when put in the pot containing 7000 lb of melted metal. The furnace has remelted as much as 200,000 lb of scrap dies in four days.



TAKES DIES IN ONE GULP
*. . . furnace has 25,000-lb capacity*

**More Pour**—Additional savings are realized because the company has tripled its Kirksite pouring capacity with no increase in personnel. Ten-ton dies have been poured on many occasions.

Tilting speed of the furnace is controlled by a single lever that actuates the hydraulic system.

A safety factor is provided by the design of the pot. The radius is such that the creeping of a die is just right as it melts into the furnace.

not just brass but

# Titan brass

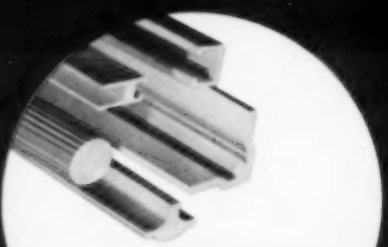
mill products...for your metal money's worth

Brass rounds available from 1/16" to 10" diameter.

Rounds

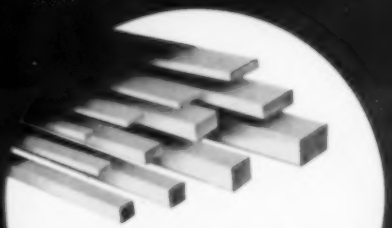
Extruded, drawn, machine-straightened . . . from 1/8" to 4".

Hexagons & Octagons



Extruded to your exact requirements.

Special Shapes



Squares up to 4 1/4". Rectangles extruded, drawn and straightened—up to 5" maximum diagonal.

Rectangles & Squares

Bronze boat shafting . . . tough, strong, corrosion-resistant Titan Naval Brass.

Tru Shaft

High-quality wire for making brass rivets, bolts, screws, other fasteners . . . available in either 65-35 or 70-30 copper-zinc alloys.

Wire

All Titan rod mill products are of highest quality brass. All sizes of finished Titan dies are ready for production and prompt delivery.

Rounds, hexagons, octagons, rectangles, squares and special shapes can be delivered in the following brass alloys: Free-Cutting Brass, Naval Brass, Leaded Naval Brass, Manganese Bronze. Extruded Leaded Nickel-Silver and Free-Cutting Commercial Bronze in limited sizes and shapes.

Send us your order.

If you want more details on Titan rod and wire mill products, send coupon below:

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Titan Metal Manufacturing Co., Bellefonte, Pa.
Gentlemen:

- ☐ Please send 20-page brass mill products booklet — "For Your Metal Money's Worth."
- ☐ Please have your representative call.

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# Titan

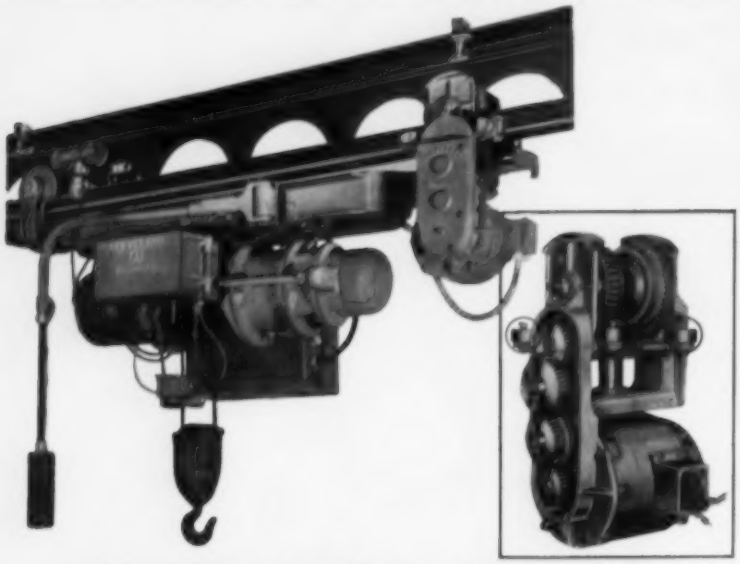
METAL MANUFACTURING COMPANY

Bellefonte, Pa. Offices and Agencies in Principal Cities

RODS · FORGINGS · DIE CASTINGS · WELDING RODS · WIRE

Quality Alloys by Brass Specialists

# BEARING TIPS by McGill



## CLEVELAND TRAMRAIL GUIDES MOTOR HEADS ON McGILL CAMROL BEARINGS

Motor-driven electric hoist carriers made by the Cleveland Tramrail Division of The Cleveland Crane & Engineering Company, incorporate McGill CAMROL Cam Follower bearings as side guide rollers for the motor head.

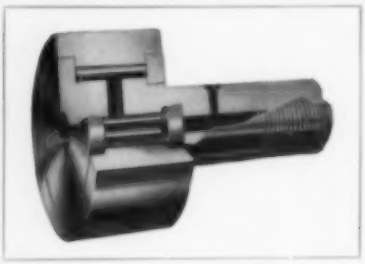
The CF bearings keep the motor head square on the monorail track used in this system and guide the head around curves. Moving on the rails at speeds up to 250 feet per minute, the bearings take the thrust load when entering into a curve.

Replacing spring loaded friction type bolt and roller units, the simplicity of mounting and the friction-free operation of the CAMROL cam followers provide dependable, trouble-free operation of the carrier assembly. Used almost six years, bearing performance has been most satisfactory.

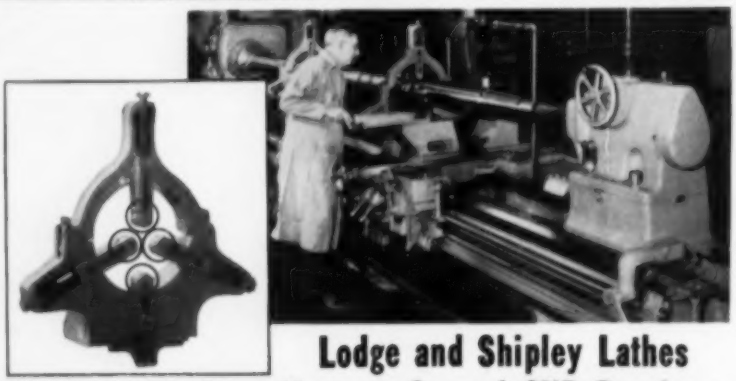
### Fact-packed Bearing Catalog

Write for your copy of Catalog No. 52, a revised 140-page Bearing Selection Guide. It contains vital product information and 30 pages of engineering data.

## CAMROL BEARINGS DIRECT ACCURATE CAM ACTION



Precision built throughout, CAMROL CF Bearings are designed to add the advantages of smooth accurate cam action to rugged shock-absorbing dependability in any type cam follower application. An interchangeable sealed SCF series protects critical installations.



## Lodge and Shipley Lathes Support 18′ Propellors on Camrol CYR Bearings

Eighteen foot propeller shafts and other large work are supported and guided accurately on Lodge and Shipley Lathes through use of Camrol CYR Bearings. The Lodge and Shipley Company has standardized on these heavy duty Cam Yoke Roller Bearings for the Roller Jaw Steady Rest on their larger Engine Lathes. Four CYR bearings are mounted in a yoke at the ends of adjustable slides to provide dependable, precision support for a variety of work.

### *CAMROL CYR Series Adapts To Yoke Mounting*

Internal construction of the CYR Series bearing is similar to that of a CF Series bearing with a heavy outer ring selection to withstand shock load. However, the stud is replaced by an inner ring for receiving shaft in a yoke mounting.

**Insure performance with McGILL®**

**MULTIROL® GUIDEROL® CAMROL®**
**Full Type Roller Bearings**

**McGILL MANUFACTURING COMPANY, INC., 301 N. LAFAYETTE ST., VALPARAISO, INDIANA**

# Shutter Detective

**New, high-speed camera is designed to arrest split-second action. It aids trouble shooting**

ONE OF the big problems in analyzing trouble spots in a machine shop is that things often happen too fast.

But when a large number of parts are turned out by one machine, the operation should be checked closely if rejects reach about 1 per cent.

**Shutter Study**—High-speed motion pictures of the operation may reveal the effects of vibrating drills, vibrating stock or lack of contact between a cutting lubricant and the cutting surface, a cause of excessive heat.

High-speed motion study of industrial operations is one target for the new Motion Analysis Camera (MAC) built by Fairchild Camera & Instrument Corp., Syosset, N. Y. It's designed to take pictures at a rate of 5000 a second.

**Versatile**—The 16-mm camera, using rotating prisms, was designed for versatility as well as speed. The manufacturer says the unit is relatively inexpensive, yet surprisingly rugged. Minimum of maintenance is required. The housings are heat-treated cast aluminum alloy and are designed to take high shock.

It also is said to be simple to operate. There is only one switch on the camera, and two sockets—one for motor power and one for the timing light.

At rates up to 1000 pictures a second, an adjustable brake can be set to prevent overrun of the feed spool when the camera is stopped and started for several runs on a single roll of film. The model has a film capacity of 100 and 200 ft, using daylight loading spools.

Prime areas for industrial application include the study of automatic machinery, electrical and hydraulic phenomena.

The MAC recently was used to study motion of an electrical relay. With an oscilloscope and time light in the picture, the camera showed faulty spring action. It saved the company a complete re-engineering project.

When you buy *Acme-Gridley*
you get **SERVICE**
***ANYTIME, ANYWHERE***

Tooling for *top* performance is a "must" in today's relentless battle to curb rising costs. Why not profit by performance facts already proved by many users of Acme-Gridley automatic bar and chucking machines.

Our engineers will help you select the tooling best suited to quantity output of new items, or check your present tooling setups against current practices in order to provide lowest production costs possible.

National Acme

The NAMCO nameplate on your machine assures service — in emergency or normal situations — when and where you need it.

THE NATIONAL ACME COMPANY • 189 East 131st Street, Cleveland 8, Ohio

A typical new product planning session at Argus includes, from left to right: N. L. Symons, Director of Purchases; G. D. Flannery, Purchasing Agent; M. K. Carr, Chief Product Engineer; J. N. Steel, Advertising Manager; C. F. Myers, Superintendent of Mechanical Processing.

# A VISIT TO ARGUS* TO SEE WHAT THEY'RE DOING WITH ALCOA SCREW MACHINE STOCK

Born in the depths of the 1931 depression, Argus Cameras, Inc., now occupies the country's leading position as a manufacturer of 35 mm cameras. Aluminum plays a major role in making the broad Argus line of photographic equipment light, lasting and above all salable. Projector housings are die cast in aluminum. Lens housings, rewind knobs, focusing mechanisms are made of Alcoa® Aluminum Screw Machine Stock. One characteristic is common to all screw machine parts made by Argus. That characteristic is precision. Tolerances in "tenths of thousands" are commonplace. Diamond turned finishes are routine. Jewel-like appearance is a production byword.

Although quality appearance is mandatory at Argus, it may not be a requirement of your product. Consider, then, the other reasons why the trend to aluminum screw machine parts can no longer be bucked: excellent machinability of today's free-cutting Alcoa alloys . . . electrical and thermal conductivity . . . corrosion resistance. High performance of the finished part, coupled with the solid economic fact that you get three times as many parts per pound as with heavy metal, makes up the total "good sense" of aluminum. These are hard commercial reasons why aluminum, more than ever before, should be carefully considered for every screw machine part you make or specify. Help in this type of analysis is available for your product from every one of Alcoa's local sales offices listed in your phone book under "Aluminum." ALUMINUM COMPANY OF AMERICA, 874-F Alcoa Building, Pittsburgh 19, Pennsylvania.

*argus Cameras Inc.

Purchasing session on aluminum screw machine parts and stock is held by: N. L. Symons, Director of Purchases (left) and Purchasing Agents, L. H. Thomas (center) and G. D. Flannery (right).

## IN PURCHASING

"Our purchasing department at Argus demands dependability from suppliers. It is this single fact that has characterized our relationship with Alcoa over the past 11 years. We have never had a reject of Alcoa Screw Machine Stock. Alcoa's research and development aid are always available when needed. We don't believe you could ask more of a supplier than we get willingly from Alcoa."

## IN DESIGN

"The low cost of aluminum is a tremendous factor in the manufacture of a volume product like cameras. But beyond that, we in design lean heavily on aluminum for the better product it makes possible. Light weight and corrosion resistance are mandatory in cameras. The permanent black anodized finish, possible with aluminum, has led to its use in place of brass for some parts like lens-retaining rings. Freedom from plating makes parts like lens mounts and focusing mechanisms more practical in aluminum than brass or steel.

"In design considerations, the combination of Alcoa literature and Alcoa technical assistance gives us firm foundations of fact on which we can make decisions."

Design consultation on aluminum parts includes: Chief Product Engineer, M. K. Carr (standing) and Assistant Chief Product Engineer, E. O. Zill (seated).

Typical parts machined by Argus from Alcoa Aluminum Screw Machine Stock.

## IN PRODUCTION

"We machine aluminum at tremendous feeds and speeds. Many of our parts require 75% stock removal. For these, the machinability of aluminum and its high scrap value stand us in good stead. The fine finish, so necessary to camera parts, is easily attainable with Alcoa Screw Machine Stock. And in this respect, consistency of quality from one shipment to the next is perhaps the place where Alcoa serves us best. Fine threads and close tolerances are second nature to us. We like the way aluminum gives us these qualities without constant tool change and lost setup time."

Inspecting fine finish on aluminum lens mounts are: A. E. Danner, Shop Foreman (left) and C. F. Myers, Superintendent of Mechanical Processing (right).

*Your Guide to the Best in Aluminum Value*

Do your operating costs vary from day to day? Here are the methods you can use to run down the reasons and the remedial steps to take

Dry solvent is transparent. You can see the boil clearly

# How To Control Degreasing Costs

"IF you can't see the boil clearly because of ghost vapor, you may be losing money through inefficient operation of your degreaser. Ghost vapor (see photo on the right above) indicates moisture which increases the diffusion losses of your solvent."

That is the advice of P. R. Hendrixson, chlorine products service manager of Du Pont's Electrochemicals department, Wilmington, Del.

Here are five chief points he studies when analyzing degreaser operating costs: 1. Solvent consumption. 2. Maintenance expense. 3. Operating labor. 4. Utilities. 5. Uniform results.

**Consumption** — Degreasing fluid is used up or lost by diffusion, by dragout on work being cleaned, in discarded sludge and through leaks. Machine location, design and operation are important: They can easily double or triple losses.

Conveyorized and canopied equipment operating at capacity should lose no more than ½ to 1 gallon of solvent per ton of free-draining work. Under the same conditions, manual units will use 20 to 40 per cent more solvent. Small parts, like screw machine products or small stampings, will consume even more because of dragout and diffusion; automatics will use about 1¼ to 1¾-gallons per ton of work, manuals 20 to 30 per cent more.

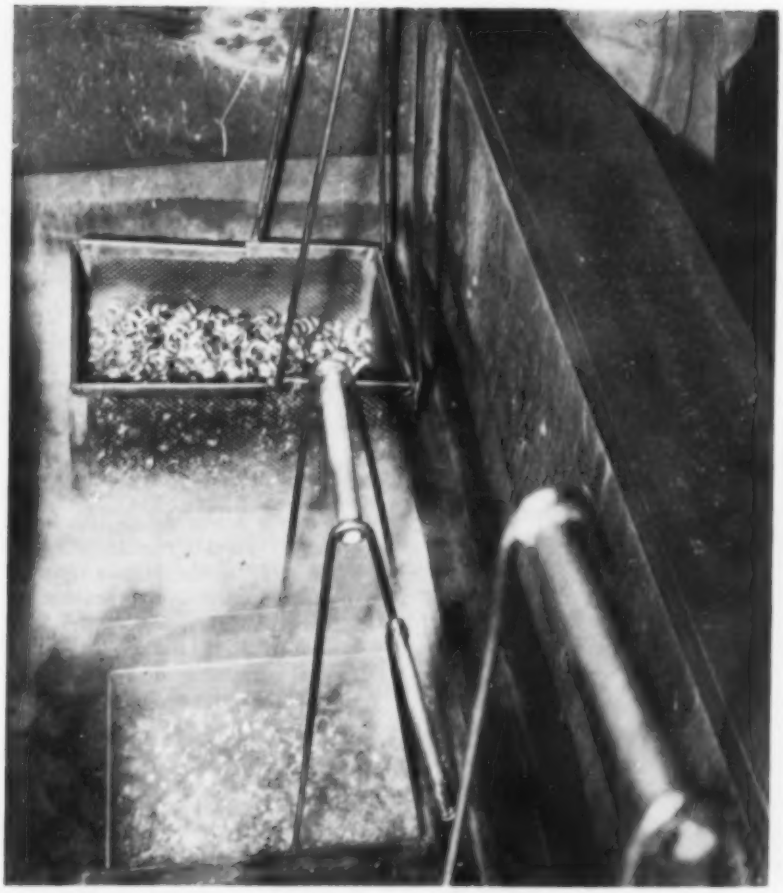
Noncontinuous operations depend on the installation. Historical data are important.

**Maintenance** — Degreasers are cleaned out when sludges impair the efficiency of the heating elements, when metal chips restrict solvent circulation and when the oil content in the sump exceeds 25 per cent.

Modern neutral degreasing solvents usually are free of sludging tendencies, so that hand cleaning of heating elements and transfer surfaces is minimized. Where auxiliary stills are not used, periodic cleanouts are unavoidable.

**Antisludging**—You can save up to a cent per pound of solvent used, (not counting the savings from uninterrupted production) by using a still and an antisludging solvent with automatic equipment.

An operator using five drums of



Ghost vapors indicate moisture in the tank, contribute to diffusion losses

trichlorethylene a month in two, average manual units may require four cleanouts. This might cost up to $80. A still, plus an anti-sludging solvent, can eliminate three cleanouts. Savings: $60.

**Operating**—Degreaser operation uses but a small part of production manpower. Conveyors are useful, and centralized locations based on work flow can give the lowest over-all cost. Some plants prefer several small units which are strategically located for convenience and versatility.

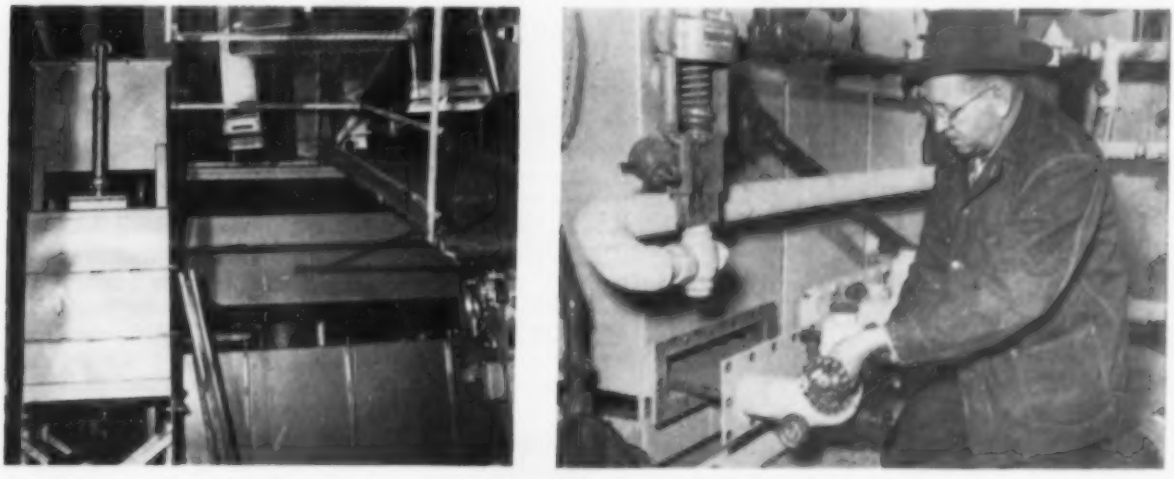
**Utilities** — Heating and cooling costs should be low. Manual units require an input of 4000 to 6000 Btu per hour and 8 to 10 gallons of cooling water per 100 lb of steel cleaned.

In conveyorized units, where operations are more uniform, those costs may be 20 to 30 per cent lower. Continuous operation at capacity or near-capacity is best.

**Uniformity** — A degreaser that produces nonuniform results is an expensive operation and produces more rejects than necessary. Close regulation of heat balance at or near design standards is a necessity. A careful check should also be maintained on the rate of vapor generation—this is an indicator of degreaser bath cleanliness and vapor action.

**Why They Vary**—Economies will depend on the amount of care and thought given to conservation, efficiency, frequency of maintenance, work handling and control of utilities. Type of workpiece and operation will have the most influence on cost; no single estimate is adequate.

The time proved way to check your costs is to ask the solvent supplier to help you. Many manufacturers make it a regular service.

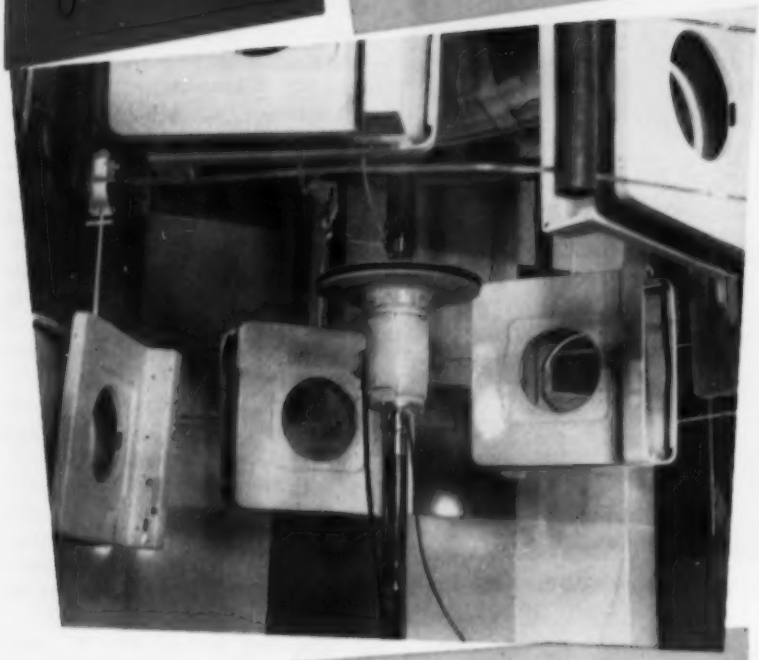


Still shown on the left minimizes down time for periodic hand cleaning (right)

# NOW

*for the first time...*

**PORCELAIN ENAMEL**
**is being applied successfully—**
**Yes, even spectacularly—**
**with RANSBURG NO. 2**
**ELECTROSTATIC SPRAY**
**PROCESS**



General Electric—an extensive user of Ransburg Electro-Spray for painting with synthetic enamels—is the first to use Ransburg No. 2 Process in the application of porcelain enamel.

GE—less than a year in electrostatic production—now is processing almost a million square feet of cover coat each month in the General Electric Home Laundry finishing department at Appliance Park.

**DRYER TOPS AND WASHER COVERS ARE BEING COATED ELECTROSTATICALLY WITH THESE SPECTACULAR RESULTS**

Quality of appearance and chip resistance are greatly improved with all colors: white, yellow, pink, turquoise, blue and brown.

About 97% of the atomized enamel is deposited on the washer and dryer parts.

Because of improved uniformity in coating thickness, weight of applied enamel was substantially reduced.

Because of lower application weight, the few rejected parts can be re-processed more times before being scrapped. This reduces the ultimate scrap rate by at least 95% of that previously expected.

Efficiency, measured by the amount of good ware, averages above 90%.

*Want your products tested?*

Ransburg has fully equipped laboratory facilities including reciprocating disks, helical conveyors, stationary disks, and the latest advancements in equipment for applying porcelain enamel with the No. 2 Electrostatic Spray Process. Manufacturers are invited to send sample products to our Indianapolis laboratories for tests and demonstrations to prove for you the advantages and benefits of electrostatic spray application of porcelain enamels.

*Ransburg* ELECTRO-COATING CORP.
Indianapolis 7, Indiana

RANSBURG

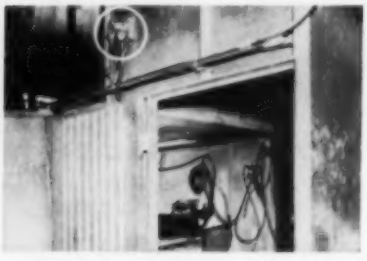

# Ceramic Circulator

TROUBLE-FREE regulation is the secret to a successful circulating system for ceramic finishes and glazes. Such an installation has been in use at the Hotpoint Co., Chicago, since April, 1955. Improvements in quality and uniformity have been noted.

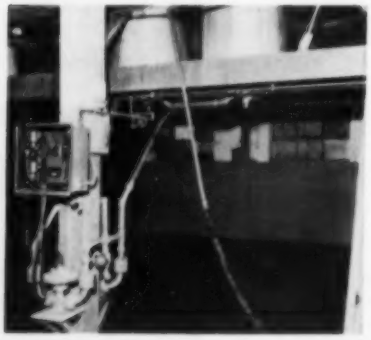
**Regulator**—The system is the result of five years of research and development by the Binks Mfg. Co., Chicago. It circulates identical material to three spray stations, insuring uniform finishes.

Here is how it operates: After the frit is milled, it is stored in stainless steel tanks. Gravity carries it through magnetic separators to a pump which lifts it to stainless steel mixing tanks.

From the mixing tanks, frit is pumped past all three spray stations. What is not used is returned to the tanks. The diaphragm pumps are designed to resist the abrasive action of the frit.



The diaphragm pumps which circulate the frit are at the lower left. Circled above is the regulator



**Heart**—The regulator at each spray station is the heart of the system. It maintains the necessary flow and fluid pressure at the station.

A circulating system eliminates pressure tanks and the network of hoses. It reduces the chance for contamination, and minimizes waste.

## Self-Balancing Mount Speeds Portable Tool Operations

Radarm takes portable tools to the work at the same angle every time.

Bolts and a flexible link chain hold the tool securely in a V-shaped grip to maintain a constant vertical alignment within a 30-in. radius.

The unit can be used with air and electric drills, tappers, screw drivers and other tools.

The base can be attached to any horizontal or vertical surface, or it can be reversed so the arm of the mount is suspended rather than supported by the base.

Radarm can be mounted on walls or columns along conveyorized assembly lines as easily as on workbenches. Because it combines a balancing mechanism with the tool mount, there is less operator fatigue. Tool breakage and work spoilage are reduced.

The scissorslike, stretching arms of the unit can be tensioned according to the demands of the work and the tool being held.

The unit is equipped with a tension spring suitable for tools weighing from 5 to 11 lb. An additional spring can be used with tools weighing from 3 to 5 lb. Special springs for heavier tools are available. *Write*: Radarm Sales Division, Pneuma-Serve Inc., P.O. Box 1025, Cleveland 2, O. *Phone*: Melrose 1-7200

## Internal Grinder Adapts to Automatic Lines

The Centalign has a 10-in. swing and a 1-in. grinding stroke. It is for long run, high production grinding of bearing raceways, taper bores and similar operations.

Certain types of recurring, short run operations are feasible because the machine is controlled by programming cam sets which can be readily interchanged.

To reduce deflections and insure better alignment, the workhead, wheelhead and longitudinal and cross-slide motions of the wheel slide are in a common plane.

Vibration absorbers in the fabricated bed assure fine finishes and consistent accuracy.

Length of the grinding stroke can be adjusted from 1/16 to 1 in. during operation or when the machine is idle. Total wheel slide stroke is 8 in.

Variable rates of power cross feed allow selection of the best rate of in-feed. Crossfeed motion is ¾-in.

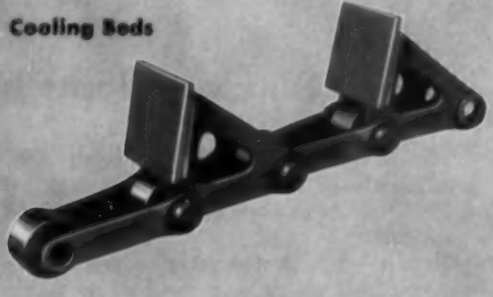
Two shoe centerless fixtures are available. The larger will hold work up to 4-in. OD; the smaller, 2-in. OD.

Feedback can be applied to the machine. *Write*: Bryant Chucking Grinder Co., Springfield, Vt.

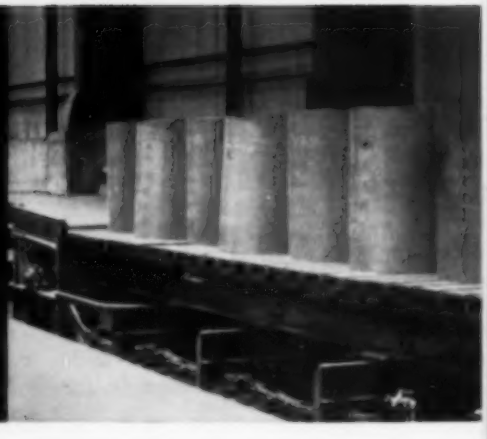
Crop Conveyors

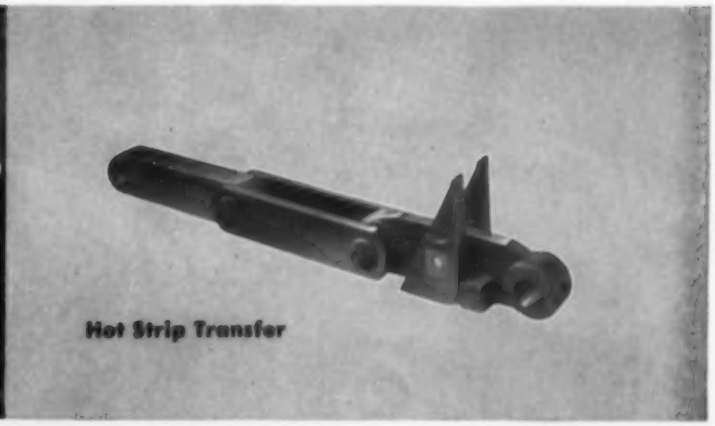
**JEFFREY steel mill chains are built for rigorous, continuous operation**

Cooling Beds



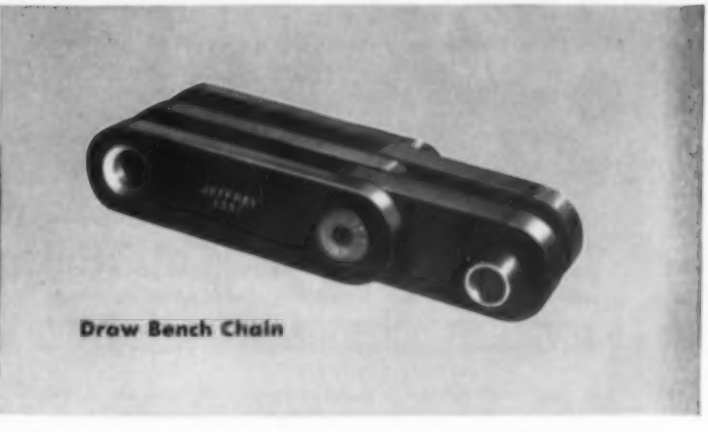
Sheet Coil Conveyors





Hot Strip Transfer

Hot Coil Conveyors



Draw Bench Chain

**Jeffrey chains** are engineered and built to withstand the grueling services encountered in the steel industry. Our manufacturing standards are high. Machining, heat treatment, assembly and inspection are closely controlled to insure that these products meet Jeffrey's high quality standards.

Metals are chosen for maximum strength with minimum weight. Extra metal is designed into chain where wear conditions are most severe.

There's a type of Jeffrey chain and attachment to suit every steel mill requirement. Choose Jeffrey chain for smooth, economical operation and long life.

Jeffrey chains are carried in stock by distributors all over the country. The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

# HOW BIG

## IS YOUR LIFTING JOB?

Whatever the weight and size of the loads, *absolute dependability* is vital in crane service. That means complete reliability in structure and function. For no crane is better than its components.

"Shaw-Box" Cranes are recognized by industry the world over for enduring stamina and operational features that assure continuous performance, all-around safety and convenient, low-cost maintenance. They are the products of an organization responsible for many innovations now accepted as standard in crane manufacture. The same vision and resources are now creating new departures in overhead load-handling equipment to meet future needs. Consequently, your purchase dollars buy *plus value* when you invest in a "Shaw-Box" Crane.

If your plans call for a crane to handle 500-lb. loads or 300 tons or more, Shaw-Box offers you the widest choice of standard types and capacities available anywhere. There is no need for compromise. We will gladly work with your staff or your engineering counsel to make sure you get the right crane for the job, economically. Let us know your requirements or write for Catalog 219.

"Shaw-Box" ® CRANES

MANNING, MAXWELL & MOORE, INC.

MUSKEGON, MICHIGAN

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

## NEW PRODUCTS and equipment

### Sandblasting Machine

Model CA 2460 has two blast hoses working off two sand control valves. The double chamber machine holds 1000 lb of sand.

All blasting is done from the bottom chamber; this permits the upper chamber to be refilled without interrupting the operation. Abrasive in the upper chamber automatically transfers to the lower.

If desired, only one hose can be used. *Write*: Clementina Ltd., 2277 Jerrold Ave., San Francisco 24, Calif. *Phone*: Atwater 2-1429

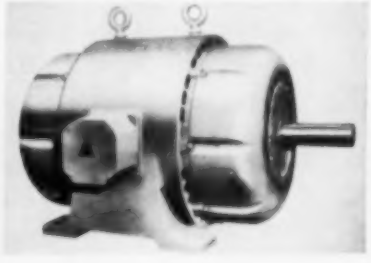
### Spray Control

Viscomatic is an external dial temperature controller for hot spray heaters. Its sensing element reads fluid temperature and controls it within $\pm 2°F$ in the range from 90 to 170°F. *Write*: Spee-Flo Co., 720 Polk Ave., Houston, Tex. *Phone*: Blackstone 0461

### Fan Cooled Motor

A wide range of speeds are offered by a series of motors ranging from 50 to 200 hp.

The totally enclosed units have two external cooling fans, one at each end, which draw cool air directly across each bearing, then



JALTEN
gives equal strength
with lighter weight
High-fatigue loads increase payloads. Jalten steel in truck, trailer, and bus frames reduces over-all weight and induces low-cost operations.

# Low alloy, high strength Jalten offers good formability coupled with excellent corrosion and abrasion resistance

Jalten's high strength permits high design loads. It also permits a reduction in section when used to replace mild steels. Usually the reduction amounts to two gages affording a weight savings of approximately 25 per cent. Thus, dead weight can be eliminated—resulting in increased carrying capacity. Also, it is easily welded.

Jalten is furnished in four grades:

**No. 1**—possesses high strength, good formability and fabricating qualities—good resistance to low temperature impact.

**No. 2**—offers high strength, moderate formability—improved resistance to atmospheric corrosion.

**No. 3**—gives high strength—improved resistance to abrasion.

**No. 4**—provides superior formability and surface quality for bumper stock applications requiring plating.

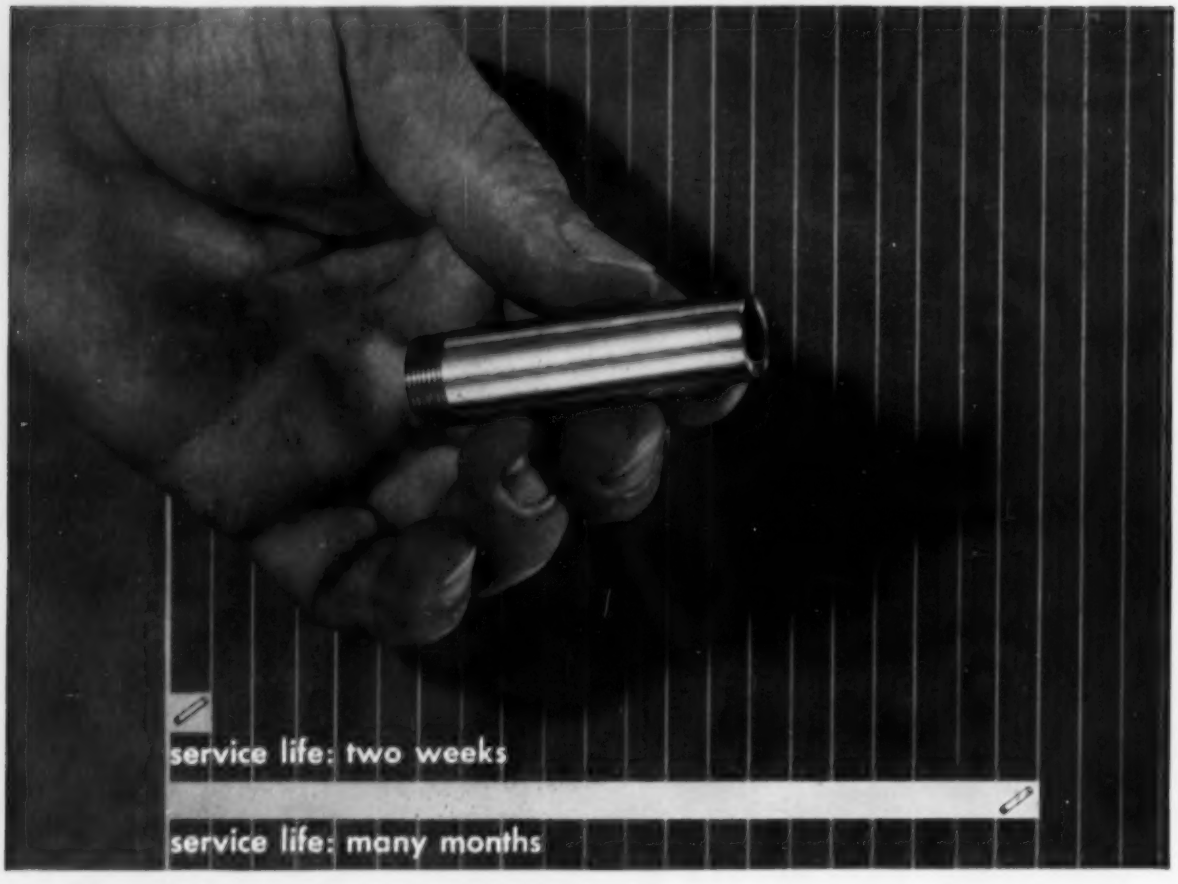
Jalten Steels are available as sheets, strip, plates, structurals, bars and small shape sections.

**SEND FOR THIS NEW BOOK:**
Chemical properties of Jalten
Mechanical properties of Jalten
Jalten equivalents
Jalten application data

**Jones & Laughlin**
STEEL CORPORATION · PITTSBURGH

J&L STEEL

*Carpenter* ... pioneers in specially-engineered steels through continuing research




# HOW FAR CAN YOU GO

## *in reducing replacements of critical parts?*

Every two weeks chrome-nickel stainless nozzles in a battery-filling machine corroded so badly from hot sulphuric acid that they had to be replaced. Hard rubber nozzles failed even quicker. Replacement time ran as high as 30 minutes. Here was a real opportunity for improvement . . . and the manufacturer met the challenge.

He called in the specialists who developed industry's first sulphuric acid-resisting stainless in rolled form. This unique Carpenter Super Alloy was a natural. After many months of continuous use, the new nozzles show no signs of corrosion. Eliminating frequent shut-downs has boosted battery production and reduced costs substantially.

Isn't there a place in your company for Carpenter men to work with you toward improved products and easier, more economical production? A wide range of quality steels for virtually any critical application are backed by able and conscientious people who want to do business with you.

The opportunity is here. You can initiate this forward step in your plant by sending for a copy of Carpenter's 32-page book, "Service on Specialty Steels." *The Carpenter Steel Co., 139 W. Bern St., Reading, Pa.*

**Are you taking advantage of these specially-engineered steels as made by Carpenter?**

Matched Tool and Die Steels / Stainless Steels / Special Purpose Alloy Steels / Silicon and High Nickel Alloys / Valve, Heat-Resisting and Super Alloy Steels / Tubing and Pipe / Fine Wire Specialties

*Carpenter* STEEL

**for product improvement**

drive it the length of the motor through large cooling tunnels cast in the walls of the main frame.

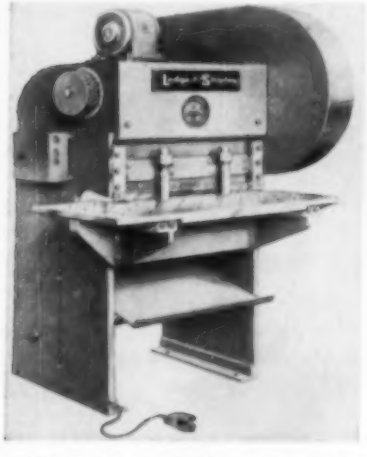
The motor operates quietly and has a deflector at the end of each air passage to direct the discharge air away from the cool air intake.

Bearings and bearing housings are selectively mated to provide an accurate fit. *Write*: Delco Products Division, General Motors Corp., Dayton 1, O. *Phone*: Hemlock 0411

## Production Shear

The Speed Shear operates at up to 120 strokes a minute. Its blade length is 24 in.; the throat is 7½-in. deep.

With ¼-in. mild steel, the shear will do straight and angle shearing, sequence shearing, slitting, notching and blanking. It duplicates straight sided parts without dies.



The table extends around the left end of the blade for convenience in notching and slitting. All adjustments are made in front. *Write*: Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, O. *Phone*: Cherry 1-7635

## Floor Patching

Sonopatch is a nonbituminous, powdered mixture which sets up in 30 minutes under normal drying conditions. Within an hour, trucks can be moved over it.

The material yields a compressive strength of over 2000 psi after a few hours and is ultimately capa-

there's only one MALLEABRASIVE!

Since 1939, when the introduction of Malleabrasive revolutionized blast-cleaning, there has been only one MALLEABRASIVE!

MALLEABRASIVE was developed through exhaustive research. Its leadership has been maintained through continuing research and improvement.

- Today there is still only one genuine MALLEABRASIVE.
- MALLEABRASIVE has no exact counterpart—there is no other product exactly like it.
- MALLEABRASIVE is patented because of its own distinctive metallurgical characteristics.
- MALLEABRASIVE is produced only by manufacture under the full and complete MALLEABRASIVE process—used by Globe exclusively.

The qualities that make Malleabrasive distinctively different have made it the most widely used premium abrasive in the world today. In hundreds of plants it has made important reductions in blast-cleaning costs. Undoubtedly it can do the same in yours. At least, why not investigate its possibilities? Write us.

THE GLOBE STEEL ABRASIVE COMPANY
MANSFIELD, OHIO
*Subsidiary of Pittsburgh Crushed Steel Co., Pittsburgh, Pa.*
*Also sold and recommended by Pangborn Corp., Hagerstown, Md.*

MALLEABRASIVE®

push button control

## speeds operation and set-up on new Rockford **hydraulic** slotter

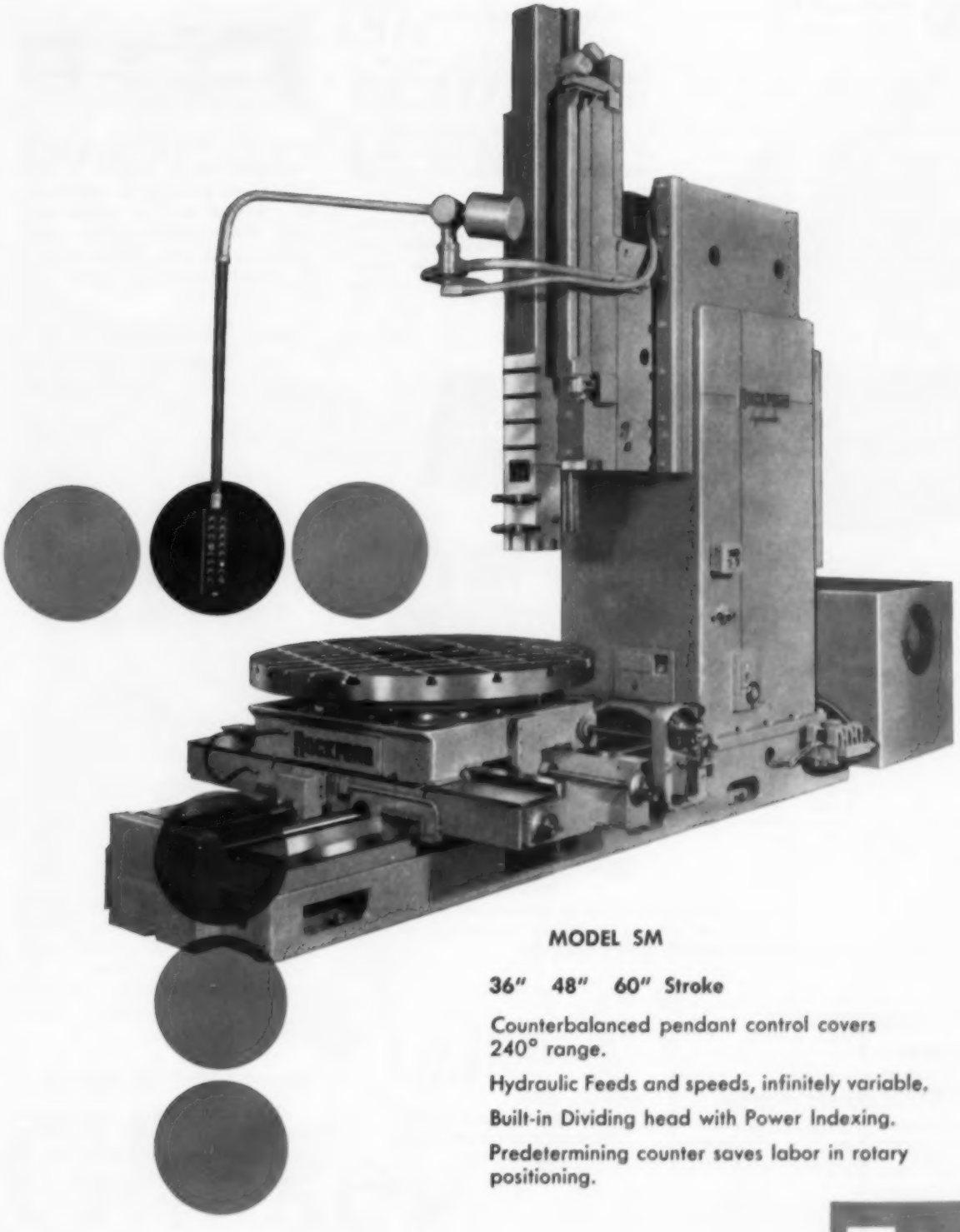
All longitudinal, transverse and rotary movements are selected and operated from the push button station of this new Rockford hydraulic Slotter.

The ram lock is pendant operated and ram stroke length and position are completely push button controlled.

Two-speed table traverse is available, enabling the machine operator to position the work to a few thousandths, without manual movements, although manual control of all movements is available from either side of the machine.

Full hydraulic drive provides two cutting ranges, one for high speeds and low cutting forces; the other for slow speeds and heavy cuts.

Get full details on this new hydraulic slotter from any Rockford Machine Tool Co. representative, or write directly to us.



**MODEL SM**

**36" 48" 60" Stroke**

Counterbalanced pendant control covers 240° range.

Hydraulic Feeds and speeds, infinitely variable.

Built-in Dividing head with Power Indexing.

Predetermining counter saves labor in rotary positioning.

**ROCKFORD MACHINE TOOL CO.**
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

**HYDRAULIC**

ble of supporting loads of more than 10,000 lb.

Sonopatch is mixed with water and poured in place to any thickness. It is self-leveling, nonshrinking and bonds firmly. *Write*: Building Products Division, L. Sonneborn Sons Inc., 404 Fourth Ave., New York 17, N. Y. *Phone*: Oregon 3-6000

## Trolley Conveyors

Series T-100 can be used on a 3-in. I-beam or a 2½ x 2¼ x ½-in. T-beam.

A special chain gives long life in ovens, spray booths and dipping operations. Its ultimate strength is 18,000 lb.

A two-piece positive grip trolley eliminates the need for load pendants. Trolley capacities range from 80 to 160 lb and can be

doubled by the use of load bars.

Systems up to 1000 ft or more with chain pulls up to 2000 lb can be operated with a single drive unit. *Write*: Chain-O-Flex Corp., 3334 Lincoln Ave., Franklin Park, Ill. *Phone*: Gladstone 5-4450

## Taper Micrometer

The Taper-Mike checks and measures with the work in the machine.

Four models have a capacity for up to 6-in. tapers. They are accurate to 0.0001-in. and self-checking to 0.0002-in. or better. *Write*: Taper Micrometer Corp., 100 Grove St., Worcester, Mass. *Phone*: Pleasant 6-6445

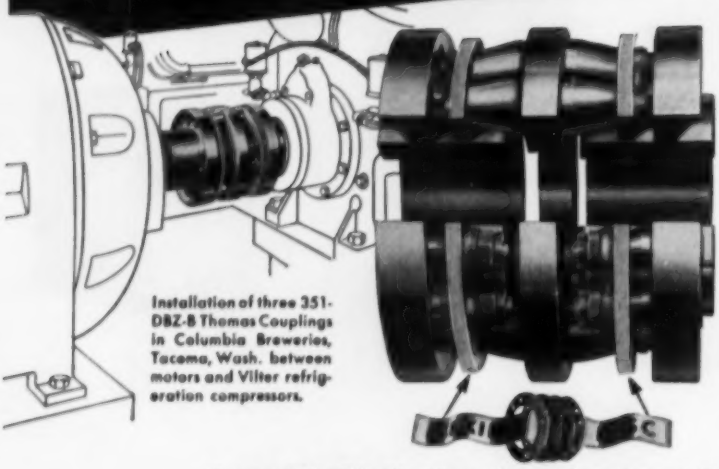
## Sheet Steel Separators

Sheet steel ranging from tin can stock to ½-in. plates is handled by the separators—permanent magnet units that induce a field when placed at the front or side of the stack.

The field causes the sheets to repel each other. Top sheets fan out with an air space between them.

A nonmagnetic case protects the unit from the demagnetizing influence of metal and metal dust particles. Stainless steel wear


THOMAS FLEXIBLE COUPLINGS...
for more years of better service!



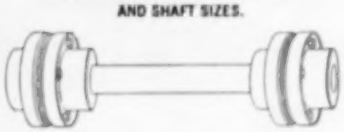
Installation of three 351-DBZ-8 Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

| FACTS | EXPLANATION |
|---|---|
| NO MAINTENANCE | Requires No Attention. Visual Inspection While Operating. |
| NO LUBRICATION | No Wearing Parts. Freedom from Shut-downs. |
| NO BACKLASH | No Loose Parts. All Parts Solidly Bolted. |
| CAN NOT "CREATE" THRUST | Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement. |
| PERMANENT TORSIONAL CHARACTERISTICS | Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained. |

THOMAS COUPLINGS ARE MADE FOR A WIDE RANGE OF SPEEDS, HORSEPOWER AND SHAFT SIZES.



Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING COMPANY
Largest Exclusive Coupling Manufacturer in the World
WARREN, PENNSYLVANIA, U.S.A.

# CHASE® NICKEL LEADED COMMERCIAL BRONZE

## Tensile Strength up 27%
## Yield Strength up 20%
### *above leaded commercial bronze!*

Rugged is the word for Chase Nickel Leaded Commercial Bronze. It has *all* the corrosion resistance of Leaded Commercial Bronze, *plus* increased tensile and yield strength. At the same time, Chase Nickel Leaded Commercial Bronze has a high relative machinability of 80%, which is excellent for screw machine work.

*This* is the bronze alloy—moderately priced—for your products that take a beating! Products like electrical fasteners, pole line hardware, nuts and bolts.

Chase Nickel Leaded Commercial Bronze is available in round and hexagonal rod form. Round sizes from ¼" to 1" diameter. Hex sizes from ¼" to ⅜" diameter. For further information, write Chase Engineering Service, Dept. A-

# Chase®

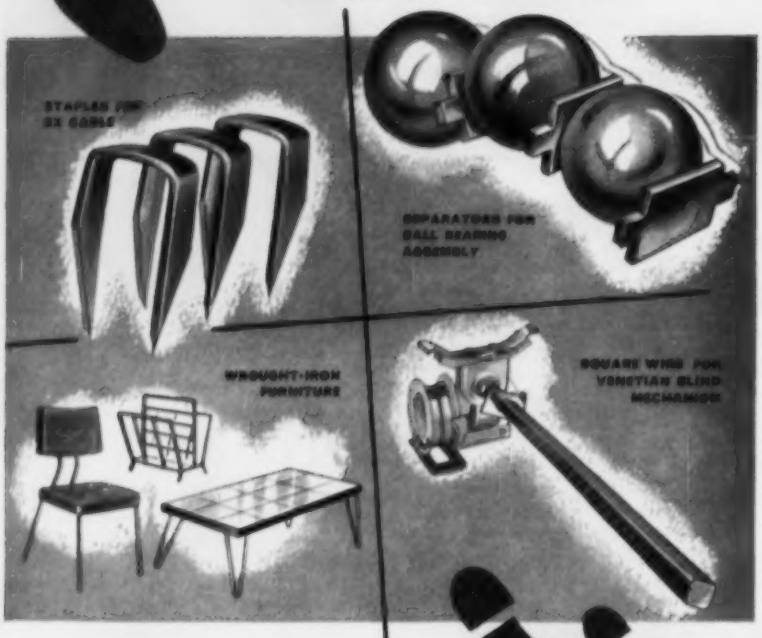
**BRASS & COPPER CO.**

**WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION**

*The Nation's Headquarters for Brass, Copper and Stainless Steel*

Atlanta, Baltimore, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Grand Rapids, Houston, Indianapolis, Kansas City, Mo., Los Angeles, Milwaukee, Minneapolis, Newark, New Orleans, New York, Philadelphia, Pittsburgh, Providence, Rochester, St. Louis, San Francisco, Seattle, Waterbury

# CONTINENTAL® FLAT & SHAPED WIRE SAVES STEPS


STAPLES FOR SIX CABLES
SEPARATORS FOR BALL BEARING ASSEMBLY
WROUGHT-IRON FURNITURE
SQUARE WIRE FOR VENETIAN BLIND MECHANISM

## ...cuts corners in production

**• STANDARD AND SPECIAL SHAPES IN MANY SIZES**

Shaped wire often saves steps by eliminating forging, stamping, and rolling operations—giving you a ready-made molding, product trim, or component that requires a minimum of further fabrication. Saves metal, too. From Continental you can obtain many cost-cutting wire shapes—V-shaped, oval, square, rectangular, triangular, keystone-shaped, and others.

**• IN A WIDE RANGE OF TEMPERS AND FINISHES**

Practically any temper, finish, or analysis in low carbon and medium low carbon steels can be specified to give you the *right* wire for the job—including #3 finish wire for electroplating.

**• PRECISE MANUFACTURING CONTROL**

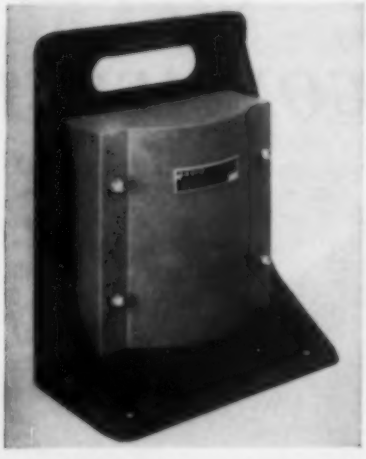
Continental Special Shaped Wire is made under strict quality control to assure uniformity. You get a better product and fewer rejects—qualities that Continental wire customers especially appreciate. Let us help *you* save production steps, too. Write for the complete story of Continental wire today.

Wire Specialists for over Half a Century

**CONTINENTAL**
**STEEL CORPORATION • KOKOMO, INDIANA**

PRODUCERS OF Manufacturers' Wire in many sizes, shapes, tempers, and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, and special wire. Also, Coated Steel Sheets, Nails, Continental Chain Link Fence, and other products.


## NEW PRODUCTS and equipment



strips, bolts and cap nuts are used to avoid shunting of the field. *Write*: E. V. Nielsen Inc., 129 Broad St., Stamford, Conn. *Phone*: Fireside 8-4275

### Nonskid Tread

An abrasive aluminum tread plate provides sure footing even when covered with oil, grease or water. It is designed for bus steps and aisles, catwalks, gun mounts, passenger trains and truck and trailer floors.

The plate is rolled from ingot by a method which puts a fused aluminum abrasive oxide on one surface. The material is durable and corrosion resistant and can be fabricated by welding, shearing, sawing, punching and drilling. *Write*: Aluminum Co. of America, Alcoa Bldg., Pittsburgh 19, Pa. *Phone*: Atlantic 1-4545

### Battery Truck Motor

The high starting torque of this direct current motor gives fast acceleration and uphill operation to industrial electric trucks and small personnel carriers.

The truck motor is rated 12, 24

# HIGHEST AWARD IN ENGINEERING

IT'S a repeat contract—and no medal or citation could indicate higher approval of McKee services.

In a half-century of engineering and construction McKee has been awarded over 2600 contracts by discerning businessmen who know what they want and where to get it. More than two-thirds of these were *repeat contracts.*

This willingness of large companies to repeatedly entrust to McKee the expenditure of millions of dollars in plant investment is proof of the value of McKee engineering and construction.

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**ENGINEERING & CONSTRUCTION**
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*Headquarters:* McKee Building • 2300 Chester Avenue • Cleveland 1, Ohio
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*British Representatives of Metals Division:* Head, Wrightson & Co., Limited
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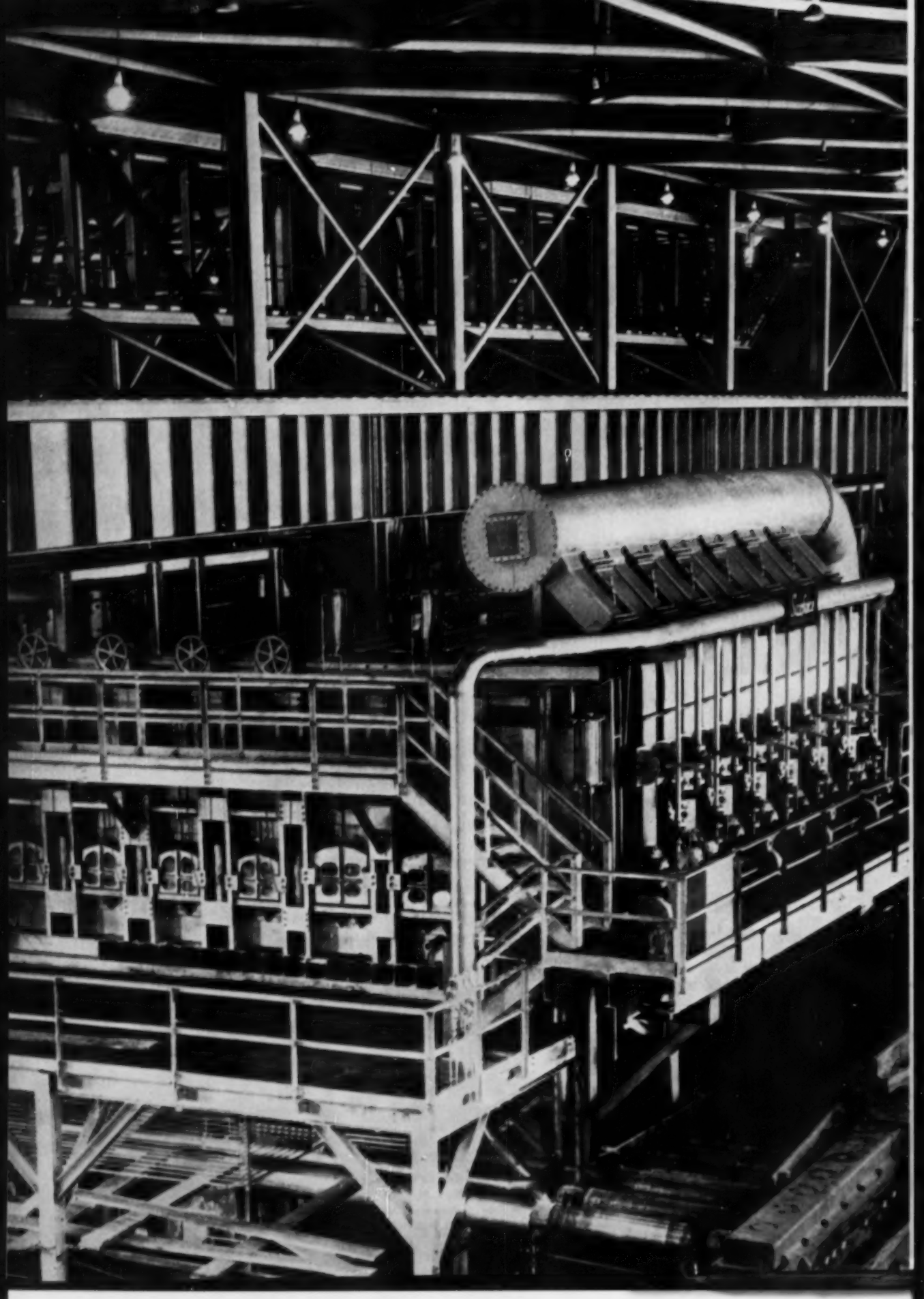

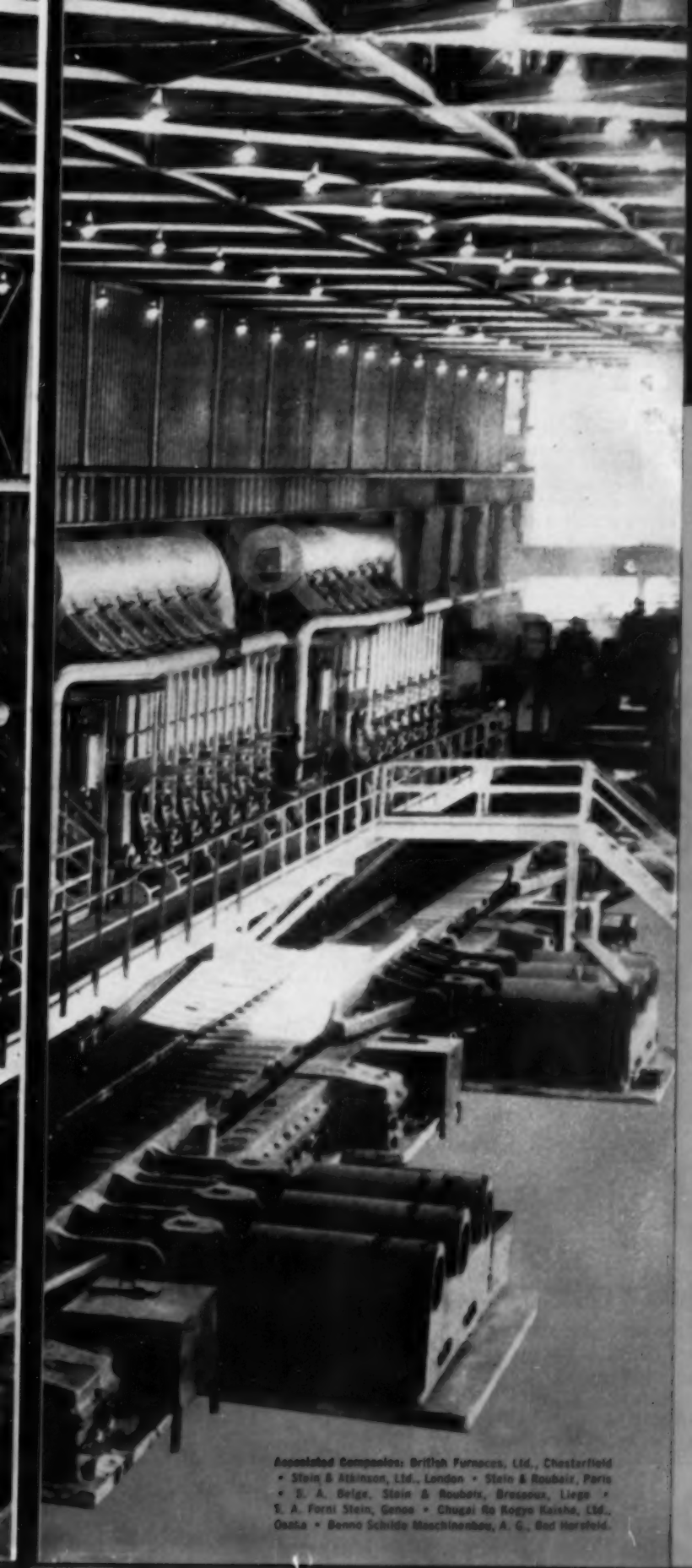

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# 200 TONS AN HOUR CONTINUOUSLY

200 tons of steel slabs are heated to rolling temperature every hour, continuously, in each of these Surface monsters—world's largest slab furnaces.

No other furnace today can list all of these features:

1 Cantilever skid supports* permitting unobstructed combustion space for underfiring.

2 Furnace lines and burner design which provide high heat input from the moment the slab enters the furnace.

3 Built-in control* to prevent intermingling of gases from upper and bottom zones, providing better control of heat application, and preventing overheated slab end.

4 Anticipatory control which reduces temperature head when rate of slab discharge decreases.

5 Air preheat up to 1100°F.

6 Television signal to pusher pulpit, informing operator of the exact position of the leading slab.

About the only conventional feature in these giants is the fact that the slabs are pushed in one end and out the other.

This is another demonstration that, at Surface, unconventional thinking and conventional experience are a productive team for the steel industry. Surface Combustion Corporation, Toledo 1, Ohio.

*patents pending

Surface
STEEL MILL EQUIPMENT

# LOWER YOUR COSTS IN PLATING

THE FINISHING TOUCH

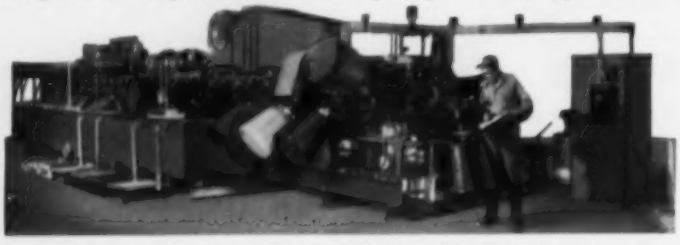
by Guy A. Cummings
*Metal Finishing Sales Manager*
FREDERIC B. STEVENS, INC.

## *How Modern Equipment Can Improve Your Operations*

Judging from the vast number of quotations on automatic equipment for electroplating, anodizing and processing being made each month at Stevens, we know the interest in automatic equipment has never been higher. To meet competitive prices, improve finishes and lower labor costs, metal finishers are constantly challenged to make modern improvements in their operations. Usually this means more modern equipment.

Let us tell you how the Stevens Automatic Barrel Plating Machines can help you. They are used for zinc, cadmium, nickel, brass plating of such small parts as screws, bolts, nuts and stampings, and also a wide variety of bulk immersion processes such as phosphatizing, washing, pickling, and chromating.

We have been making these machines for a long long time—hundreds are in operation—so you can be confident that there are no mechanical bugs. They are simple to operate—feature automatic unloading—and when equipped with automatic load devices, several machines can be operated by only one man. The cylinders which take the parts to be plated are the oblique open ended type—without



covers. By raising or lowering the cylinder the parts slide in and out without the necessity of unclamping and removing covers normally needed for horizontal type cylinders.

The Stevens simple compact design makes it economically feasible to purchase production capacities as high as 4000 pounds per hour in one machine, or just as practical to distribute the capacity between two or more machines to provide flexibility in plating thickness, production, etc.

Here are other advantages in using Stevens Automatic Barrel Machines—uniformity of deposit, fewer rejects, better working conditions, easier chemical control, better scheduling and delivery and *lower costs per piece.*

The selection of the right equipment, the capital investment required, the arrangement of your plant to install the equipment are important considerations. Frederic B. Stevens, Inc., with its long experience in the metal finishing field has made many analyses of this kind. We can help you too.

***Write to Frederic B. Stevens, Inc., 1808 18th Street, Detroit 16, Michigan.***

FREDERIC B. STEVENS
INCORPORATED
YOUR METAL FINISHING SUPERMARKET
DETROIT 16, MICHIGAN

METAL FINISHING EQUIPMENT AND SUPPLIES
FROM CASTINGS OR STAMPINGS TO
FINISHED PRODUCT

BRANCHES:
Buffalo • Cleveland • Indianapolis • New Haven

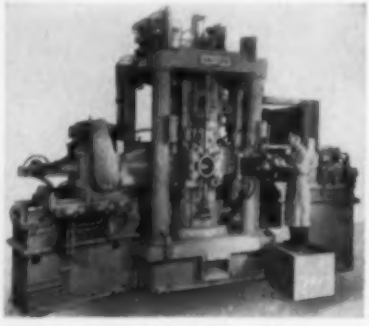

## NEW PRODUCTS and equipment

or 36 volts and from 1000 to 2400 rpm. Model BC-48 comes in ratings from 1 to 2 hp. *Write*: Specialty Component Motor Department, General Electric Co., Schenectady 5, N. Y. *Phone*: Franklin 4-2211

### Index Machine

Floor space requirements for machining long parts are reduced by this five-station, vertical trunnion index machine. The unit occupies about 148 x 214 in.

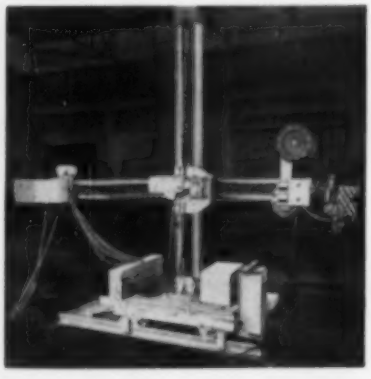
The center column holds the work fixtures and rotates the parts from station to station. The trunnion is supported by tapered roller bearings.



The machine produces 105 automotive axle housings per hour at 100 per cent efficiency. *Write*: Snyder Tool & Engineering Co., 3400 E. Lafayette, Detroit 7, Mich. *Phone*: Lorain 7-0123

### Welding Manipulator

This tool makes positioning easy for the automatic welding of bulky products. It has a 10 ft vertical working range, 12 ft of horizontal



Machining time reduced by using

# Edgewater

## Rolled Steel Rings

### how Edgewater Rolled Steel Rings are made:

A block of steel is sliced from an ingot or rolled bar. 1

2 After soaking at forging temperature it is upset and punched in a press, forming the "blank."

3 The rolling process enlarges the diameter, reduces the thickness, and forms ribs, flanges, etc., as required.

4 The ring is rolled to accurate shape and dimensions, in one continuous process.

### typical shapes rolled by Edgewater

Weldless steel rings of simple or complex cross-sections are readily rolled to close tolerances by Edgewater. The process consists of upset forging of a steel block on a press, followed by the rolling operation, in which powerful mills form shapes such as those shown at the right. Due to the accuracy of the process, a minimum of machining is needed.

Our engineers will be glad to review your requirements and recommend a shape that will best serve you.

SEND for 12-page bulletin that describes the Edgewater process for making Rolled Steel Rings.

E

**Edgewater Steel Company**

**PITTSBURGH 30, PA.**

travel and 360 degree mast rotation, yet it can weld inside a pipe 24 in. in diameter.

Welding speeds range up to 100 ipm. The manipulator's self-propelled carriage travels any desired distance on tracks laid in 10-ft sections. *Write*: Welding & Assembly Positioning Equipment Division, Worthington Corp., Plainfield, N. J. *Phone*: Plainfield 7-1200

## String Buffs

The long fiber cotton strands in these buffs withstand the effect of frictional heat and disintegration. As the face of the wheel wears, the ends of the virgin cotton fray into fluffy fiber fingers that quickly wipe a mirror finish on metal parts.

The section wheels maintain well defined corners, but have a deep pliancy that adapts evenly to irregular surfaces. The buffs are

recommended for aluminum, brass, silver and soft metal alloys, as well as for chrome and steel. *Write*: Division P-4, Schlegel Mfg. Co., Rochester 7, N. Y. *Phone*: Greenfield 1440


# 450 S.P.M. to keep production costs down

L&J

**DOUBLE CRANK STRAIGHT SIDE PRESS**

Here's new life for lagging production — speeds up to 450 strokes per minute to give you new highs in the output of small precision parts. Designed primarily for use with progressive dies this versatile press gives you everything you need — speed — accuracy — big capacity — long die life — ease of set-up. It pays off in lower production costs. Write for complete information.

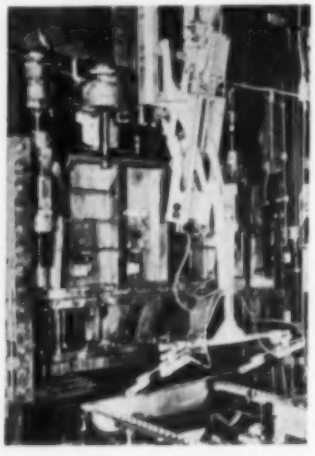
**L & J Press Corporation • 1628 Sterling Ave. • Elkhart, Indiana**

SPECIFICATIONS

| Model | 20-2-24 | 30-2-24 | 40-2-36 | 50-2-36 |
|---|---|---|---|---|
| Capacity | 20 tons | 30 tons | 40 tons | 50 tons |
| Speed, strokes per min. | 150-450 | 150-450 | 150-300 | 150-300 |
| Die space, standard | 11" | 11" | 12" | 12" |
| Ram area | 24" x 12" | 24" x 12" | 36" x 20" | 36" x 20" |
| Bolster plate | 24" x 19" | 24" x 19" | 36" x 24" | 36" x 24" |
| Stroke lengths, standard | 1"—2" | 1"—2" | 1"—3" | 1"—3" |
| Ram adjustment (ratchet) | 2" | 2" | 2" | 2" |


## Iron Hand

Bathtubs weighing 120 lb each are unloaded as fast as a 1800-ton press can make them. Production ranges from 4 to 5 a minute on blanks which are more than 6 ft. long and drawn to 15 in.



The Iron Hand lifts the tub to clear the die, then swings it out of the press onto a conveyor. A double-mounted jaw assembly handles the blank. *Write*: Sahlin Engineering Co. Inc., P.O. Box 289, Birmingham, Mich. *Phone*: Midwest 4-7373

## Automatic Die Sinker

This bed-type machine also can be used as a power or hand-operated milling machine.

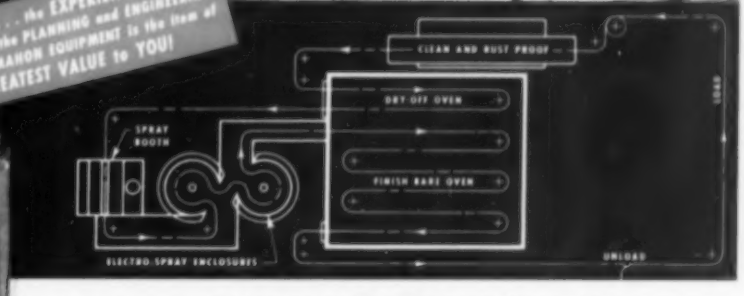
The tracer control can be used for contouring. Both workpiece and model are mounted on a 17 x 57-

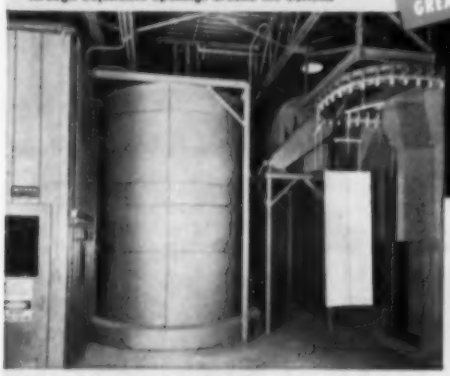
# COMPLETE *Finishing* SYSTEMS

. . . for ENAMELS • LACQUER • PAINT • VARNISH

Ventilated, Circular Electrostatic Spray Enclosure. Disc Applicator travels up and down. Air is exhausted through adjustable openings around the bottom.

. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!



Exterior of one of the two Circular Electrostatic Spray Enclosures. Air Exhaust Duct is continuous around the bottom.

Exit end of Finish Baking Oven. In this installation the Dry-Off Oven and Finish Baking Oven are combined in one unit.

## *Compact MAHON SYSTEM Finishes 2000 "SLIMFOLD" Metal Closet Doors Per Day!*

The finishing equipment shown here is a Complete Mahon Finishing System designed especially to do a particular job for Ternes Steel Company, Detroit. It includes facilities for cleaning, rust proofing, drying, spray painting, electrostatic coating and finish baking on both sliding and folding metal closet doors. This is a typical example of Mahon's service to industry. No matter what your finishing requirement may be, it will pay you to discuss methods, equipment requirements and possible production layouts with Mahon engineers . . . you will find them better qualified to advise you, and better qualified to do the all-important planning, engineering and coordinating of equipment, which is the key to fine finishes at minimum cost. And, if you care to investigate, you will find that Mahon equipment will serve you better . . . because Mahon equipment is engineered better and built better for more economical operation over a longer period of time. See Mahon's Insert in Sweet's Plant Engineering File for further information, or write for Catalog A-656. Better still, why not have a Mahon engineer call at your convenience.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems, Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

# MAHON

# Any steel bar you need . . .

# STAINLESS · ALLOY · COLD FINISHED

Keeping a big stock of steel bars in various types, grades and sizes—in stainless, alloy and cold finished steels is a mighty big expense. *And,* there's no need for it. All U.S. Steel Supply warehouses, located from coast to coast, carry a complete line of bars ready and waiting for your call. When you order steel from us, you get it fast—without delay. Why not make our warehouse your warehouse and let us carry the expense of big inventory.

U.S. Steel Supply warehouses also carry big stocks of sheet, strip, plate, shapes, tubular products, bars, expanded metal, etc.—in stainless, and carbon and alloy steels. One order can cover all your steel requirements—and we will be glad to help you select the best steel for the job. Call your local U.S. Steel Supply salesman.

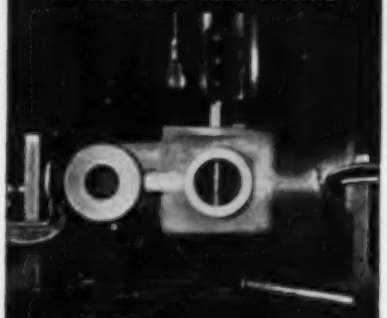
## U.S. STEEL SUPPLY

**DIVISION**

*General Offices:* **208 So. La Salle St., Chicago 4, Ill.** **Warehouses and Sales Offices Coast to Coast**

**UNITED STATES STEEL**

33% DECREASE IN DIE WEAR
ON THIS GRAY IRON FITTING



...thanks to
FERROCARBO®

Users everywhere report similar experiences. In fact, on 67 machining tests in 11 large machine shops, castings of gray iron treated with FERROCARBO averaged 89.5% greater machinability per tool than untreated castings. These premium castings are finer-grained, denser, stronger, yet they COST YOU NO MORE... because your foundryman, using FERROCARBO, makes worthwhile savings in raw material costs.

FOR FREE BOOKLET on FERROCARBO, citing actual case histories of faster machining, with longer tool life, write The Carborundum Company, Dept. 55, Niagara Falls, N.Y.

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Works: Mt. Braddock, Fayette Co., Pa.
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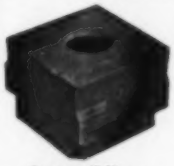

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Handle more cars better — spend less to install & maintain with Foster Relayers. "Open-stock" shipments, all sections 12# thru 175#. Switch Materials, Track items.

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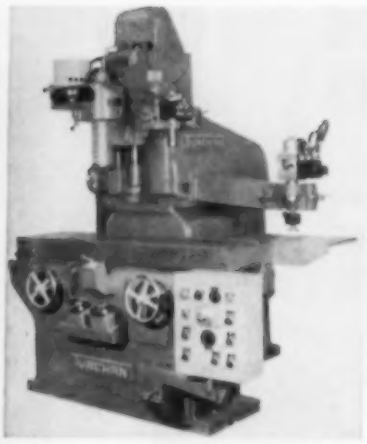

in., heavily ribbed table which has extra long guide ways. A three-way micrometer adjusting assembly makes for fast, easy setups. *Write*: Turchan Follower Machine Co., 8259 Livernois Ave., Detroit 4, Mich. *Phone*: Webster 3-6484

## Solder

Production soldering of copper, brass, nickel-plate, cadmium-plate, German silver and other metals is simplified by a rosin core solder. The rosin flux spreads quickly to remove oxides and inhibit reoxidation before the solder flows.

The activated flux has no objectionable odors or fumes and will not boil away or char under excessive heat.

The solder meets federal specification QQ-S-571b and comes in 1, 5 and 25-lb spools in diameters 0.020-in. and up. *Write*: Anchor Metal Co. Inc., 244 Boerum St., Brooklyn 6, N. Y. *Phone*: Hegeman 3-8150

## Gear Reduction Cases

Three types of cases are designed for original equipment manufacturers.

H-500 and H-501 come in four ratios: 10:1, 15:1, 25:1 and 44:1. Gears are of heavy cut steel and bronze; worm gears are straddle mounted between tapered roller bearings.

Model H-500 is available in left or right-hand drive; model H-501 mounts on either side.

Model H-600 has a reduction ratio of 17:1. Its case is made of aluminum, and the unit meets requirements up to 15 hp. *Write*: Baughman Mfg. Co., Jerseyville, Ill.

WHETHER YOU BUY...

OR SPECIFY...

This Unit Is
The Answer To
- production waste
- design problems
- fire risk
- excessive repair bills

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Automatic lubrication is one thing that designers, plant engineers and production men insist on these days —for their own machinery . . . and the equipment they manufacture. And careful purchasers make sure the automatic lubrication systems they buy are *Bijur Systems*.

For nothing protects like Bijur. Bijur Systems save production time and repair bills . . . reduce down-time and fire risk . . . lengthen machine life . . . and eliminate product spoilage due to over-lubrication. Bearings are never thirsty for oil, never flooded.

That's why it's just good business to have a custom-engineered Bijur System on the equipment you own, and *design* one into the equipment you manufacture. Installation is easy, cost is minimal, savings are substantial. Write today for *all* the facts about Bijur Systems!

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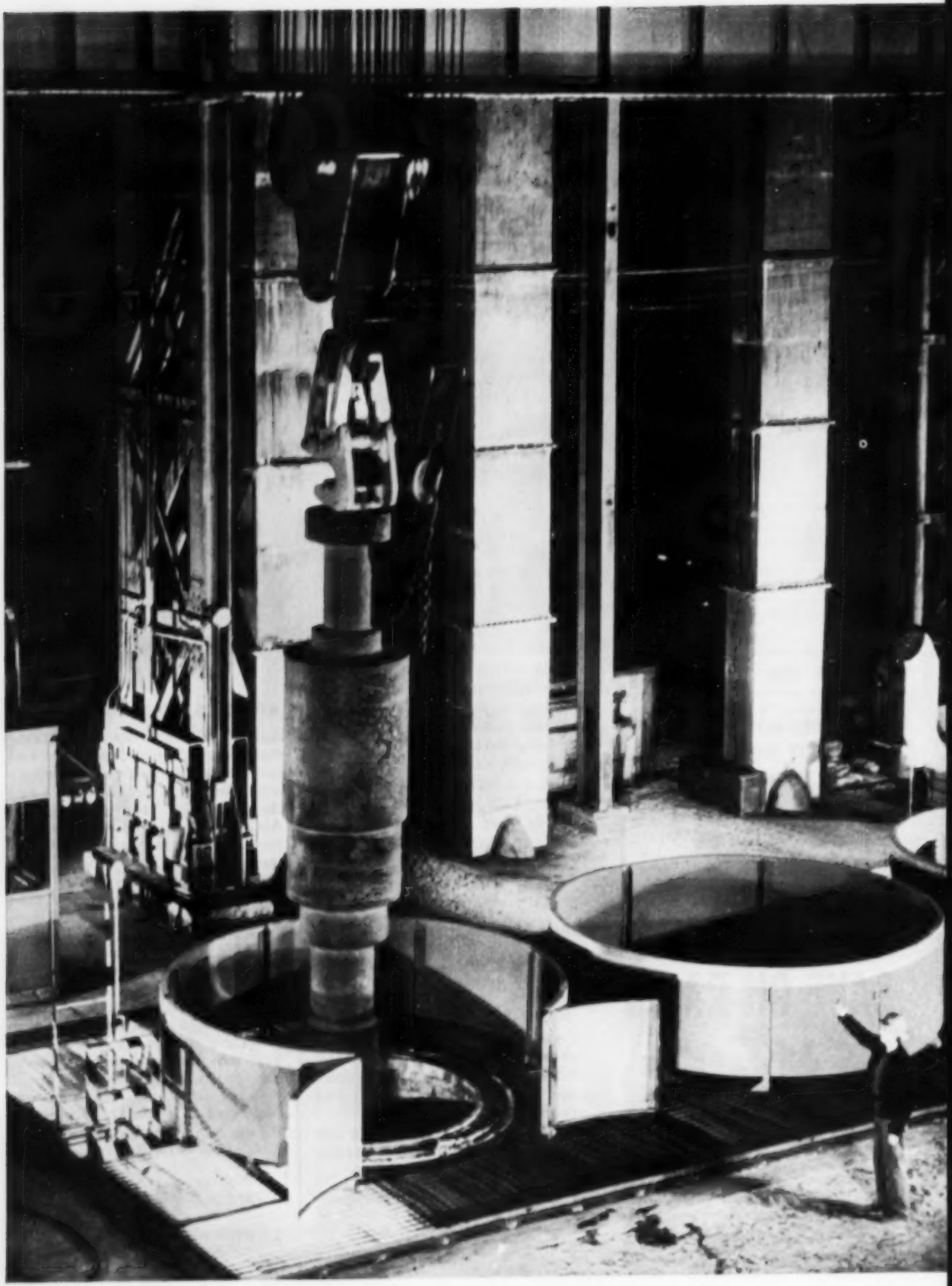
Rochelle Park, New Jersey
*Pioneers in Automatic Lubrication*



# Giants, too, heated without distortion

*Westinghouse pressurized furnaces keep 30-ft forgings "straight as an arrow" at U. S. Steel*

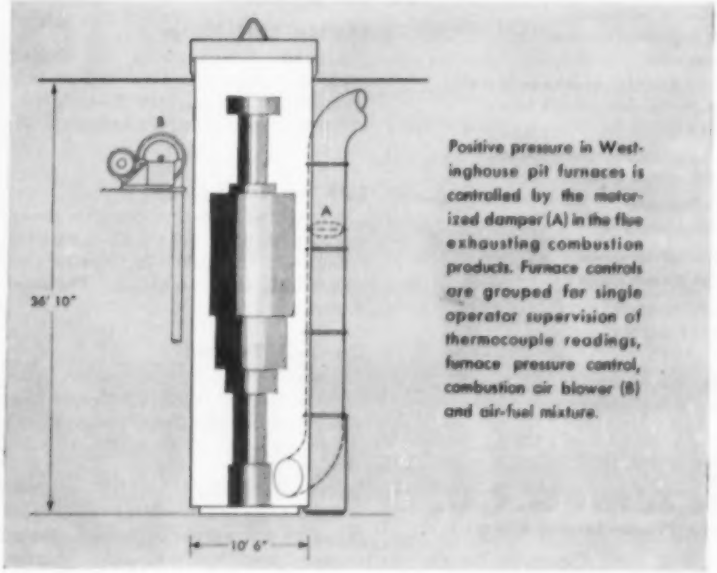
Three large, Westinghouse pit-type furnaces at U. S. Steel's Homestead Works are built to pamper giant forgings. This turbine rotor, for example, lifts out straight and true at 1830°F. During eight hours of soaking heat the temperature along its 30-foot length never varied as much as 10°F. Distortion was never a problem because of Westinghouse temperature control and positive pressure furnace design.

In this design even heating is assured through back pressure control of combustion gases. With positive pressure in the furnace any air leakage is always outward. Thus localized chilling of the work is prevented. The furnace is tangentially fired by means of spirally located burners and is equipped with 3 zones of automatic temperature control. Since the products of combustion are sucked out from the bottom of the furnace, heat currents make two passes the full length of the work...once upward, once downward.

In Westinghouse experience with gas, electric, or induction heating equipment, we have undoubtedly solved a problem like yours. You can be sure of our broad experience by calling your local Westinghouse industrial heating engineer today or write Westinghouse Electric Corporation, Industrial Heating Division, Meadville, Pa. J-10451

**WATCH WESTINGHOUSE!**

*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***




*Positive pressure in Westinghouse pit furnaces is controlled by the motorized damper (A) in the flue exhausting combustion products. Furnace controls are grouped for single operator supervision of thermocouple readings, furnace pressure control, combustion air blower (B) and air-fuel mixture.*

*W. E. Collar* reports . . .*

## Facts to lick your distortion problem

Unusual facilities and experience at Westinghouse have enabled us to jump years of trial-and-error methods in engineering furnaces and induction heating equipment to prevent distortion. We're constantly after better ways to gain temperature uniformity in metal processing equipment. This is necessary not only to prevent distortion but also to obtain desired metallurgical properties.

On special problems, our equipment design engineers have the advantage of facts gained through Westinghouse metallurgical research activities. Production testing of equipment design and engineering is carried out by our Materials Manufacturing Division at Blairsville, Penna. These activities back up our long experience in gaining accurate heat distribution for positive temperature uniformity.

The results can be seen in a Westinghouse furnace used for the air tempering of rotors for atomic equipment. Accurate heat control designed into this electrically heated furnace meets demanding requirements for distortion-free work.

Another case in point is the work on distortion problems under way in our induction heating laboratory. Here equipment is being developed for distortionless hardening of automotive axles.

The teamwork that solved these application problems is your assurance of getting the latest in engineering development and the finest equipment for all your metal processing needs.

**Manager, Industrial Heating Dept.*

*The Westinghouse Heat-Treating Family*

GAS • ELECTRIC • INDUCTION

# New PLAN-GEAR TRANSMISSION

*as simple to operate as an Electric Motor*

• Here is AMERICAN GEAR'S new **PGT** transmission as used with a Chrysler engine to power a gasoline tractor. This new, hydraulically operated compound planetary transmission has been successfully used on earth movers, road rollers, tractor loaders and other equipment.

• Complete performance tests at one of the country's leading Institutes of Technology have verified **PGT's** outstanding performance. The report on these tests describes **PGT** as "offering a simple, versatile and extremely flexible means of power transmission...good efficiency ...conservatively rated."*

• **PGT** offers these important advantages over more complex transmissions...

- Easily operated by anyone by merely moving a single hydraulic control lever
- Practically instantaneous (1.5 seconds) change of speed or direction without shifting gears
- Only one control valve lever for all speeds and neutral
- Utterly smooth...no shock...no jerk... no noise
- Cushion shift prevents shock loading, eliminates trouble
- Eliminates operator fatigue by eliminating clutch pedal
- Hydraulic control lever placed convenient to operator without regard to location of transmission
- Planetary gearing means considerably less length for comparable loads and speeds
- Positive pressure-fed lubrication to bearings and gears
- Two power take-off apertures can transmit up to one-third of engine output maximum

*Complete report on request

*Write today for this new 8-page booklet which gives complete information, design details on all 7 models of PGT transmissions*

7 DIFFERENT MODELS • 85 OR 150 TO 200 LB. FT. TORQUE
1 OR 2 SPEEDS FORWARD • CHOICE OF REVERSE RATIOS

**USE PGT TRANSMISSION ON**

Lift trucks • Earth movers • Hoists and cranes • Car pullers • Slushers
Conveyors • Power take-offs • Front end loaders • Road rollers
Other industrial equipment • Truck mixers

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**AMERICAN GEAR & MFG. CO.**

New Avenue, Lemont, Illinois • Phone: Lemont 920

Subsidiary of BRAD FOOTE GEAR WORKS, INC., Cicero 50, Illinois


# NEW Literature

Write directly to the company for a copy

### Bearings

A pocket-size, 110-page catalog covers a line of industrial bearings, bushings and bars. Johnson Bronze Co., New Castle, Pa.

### Beryllium Copper

The heat treatment of wrought and casting beryllium copper alloys is described in an 8-page bulletin. Beryllium Corp., Reading, Pa.

### Power Transmission

Flexible couplings, variable speed pulleys and transmissions, universal joints and motor bases are covered in a 12-page brochure. Department SLC, Lovejoy Flexible Coupling Co., 4800 W. Lake St., Chicago 44, Ill.

### Cable Conveyors

A 36-page engineering manual gives complete information on ordering and installing a cable conveyor system. Tipp Mfg. Co., Fourth and Franklin Sts., Tipp City, O.

### Transmissions

Variable speed transmissions for machines using up to 10-hp V-belt drives are covered in a 12-page bulletin. Maureymatic Division, Maurey Mfg. Corp., 2915 S. Wabash Ave., Chicago 16, Ill.

### High Vacuum Pumps

Bulletin 403, 4 pages, discusses six compound vacuum pumps with displacements from 2 to 46 cfm. Kinney Mfg. Division, New York Air Brake Co., 3529 Washington St., Boston 30, Mass.

### Molten Salt Pump

An air driven pump for molten salts and metals is described in bulletin 800, 4 pages. Ajax Electric Co., 988 Frankford Ave., Philadelphia 23, Pa.

### Lift Trucks Engines

Illustrated bulletins describe diesel engines for lift trucks with capacities from 6000 to 20,000 lb. Hyster Co., 2902 N.E. Clackamas St., Portland 8, Oreg.

### Carbide Tooling

Bulletin VR-437, 24 pages, presents a line of tool holders and carbide inserts. Vascoloy-Ramet Corp., Waukegan, Ill.

### Spray Painting

An 8-page bulletin cites the advantages of hot spray equipment. Paint heaters are described in a 4-page

# THIS TEAMWORK PAYS OFF

## for You!

Whenever you need a lift with a fastener problem enlist the help of your Lamson salesman, or the Industrial Distributor salesman who sells you Lamson products.

Either can call in "ELL" & "ESS" for expert assistance . . . and at no cost to you.

"ELL" & "ESS" represent the many extra services that Lamson & Sessions offer its customers. These include engineering counsel, selecting the right fastener for the job or suggestions for production economies.

This kind of teamwork is yours for the asking from Lamson & Sessions, the country's leading bolt and nut manufacturer.

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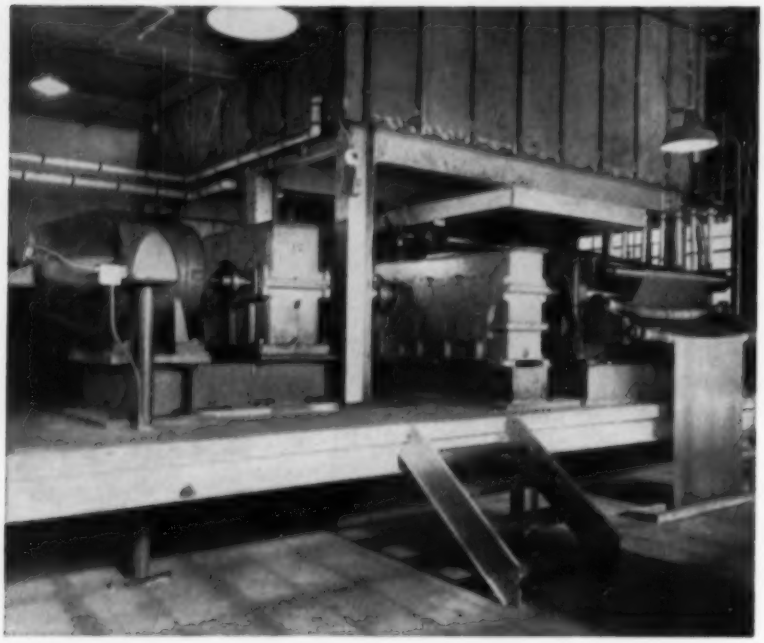
PLANTS AT CLEVELAND AND KENT, OHIO · BIRMINGHAM · CHICAGO

# Lee Rubber and Tire Corp. increases tire strength... speeds production with H & S speed reducers!



To satisfy demand for larger, heavy-duty tires, the tire industry found that Nylon cord tension must be increased. Lee Rubber and Tire Corp. solved this problem with the help of H & S engineering. At their Conshohocken, Pa. plant two new drive units consisting of a 125 H.P. motor, an H & S LD-3600 speed reducer and a special H & S seven shaft roll drive were installed.

Now 1200 to 1920 strands of Nylon pass through the tensioning cycle at a speed of 180 fpm. As the fabric leaves the "hold back roll" run at a constant speed, it passes through a temperature of 400°F for proper heat treating. H & S powered "pull up rolls" can exert a tension from 0 to 20,000 lbs. (Older drives were limited to a tension of approximately 1500 lbs.)

**The result**—greatly increased tension capacity enables the Lee Rubber and Tire Corp. to "set" the Nylon cords limiting growth in tire use to 2 or 2½%. (Formerly cord growth amounted to as much as 14%). Improved tire quality and faster production were achieved.

If you have a power transmission problem, won't you let us help you? Our diversified lines assure our unbiased recommendation. Contact your H & S representative or write us today.

**THE HORSBURGH & SCOTT CO.**
**GEARS AND SPEED REDUCERS**
5112 Hamilton Avenue
Cleveland 14, Ohio

**Send note on Company Letterhead for complete H & S Catalog**


## NEW LITERATURE

bulletin. An 8-page bulletin illustrates a large capacity paint pump. DeVilbiss Co., Toledo 1, O.

### Burr Removal

Bulletin BB-1, 4 pages, describes machines for removing burrs from finished machined cast iron and nonferrous parts. Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 38, Mich.

### Impact Welder

Bulletin 2-063, 4 pages, covers a press type welder with a ram pressure device. Taylor-Winfield Corp., Warren, O.

### Rolling Mills

A 28-page catalog presents machines for rolling ferrous and nonferrous metals in the form of sheets, strips, wire or rods. Fenn Mfg. Co., Newington, Conn.

### Bar Steels

Bulletin 55, 4 pages, describes bar steels that eliminate heat treating, straightening and cleaning operations. Bliss & Laughlin Inc., Harvey, Ill.

### LP Gas Purifier

A 4-page report tells how effectively a catalytic purifier removes obnoxious gases from the exhaust stream of LP gas powered vehicles. Oxy-Catalyst Inc., Wayne, Pa.

### Lubrication Guide

This 20-page bulletin presents lubrication systems and requirements of the company's bolt, nut, screw and rivet machinery; power presses; wire rod and tube machinery; and rolling mill machinery. Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

### Centrifugal Pumps

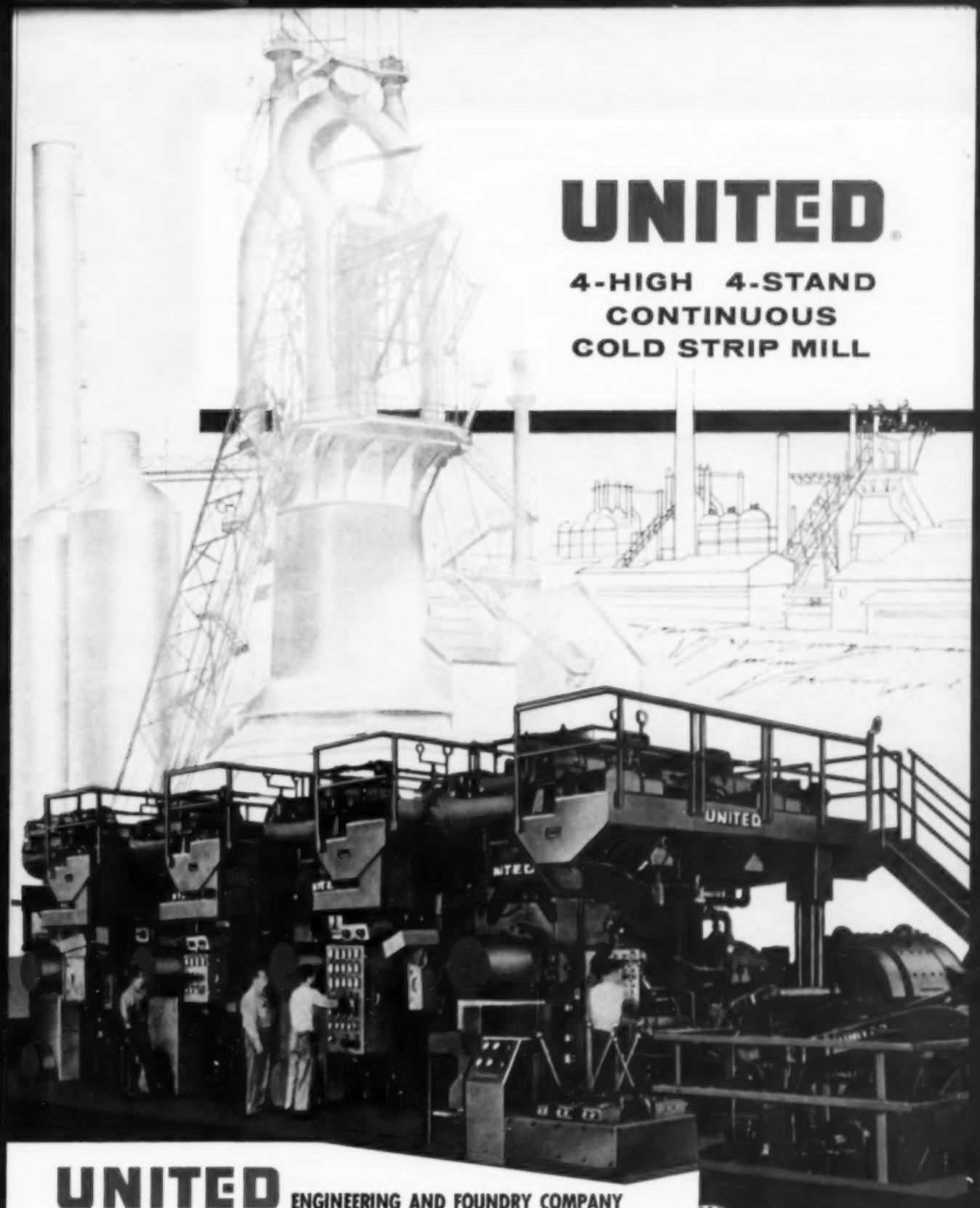
Bulletin 7248-A, 8 pages, presents a line of class DMV-DHV single-stage pumps for general hydraulic services. Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.

### Gages

"Go" and "no go" plug and thread gages are depicted in bulletin 595, 4 pages. A Kellering attachment for copying intricate forms in metal is described in bulletin 597, 4 pages. Pratt & Whitney Co. Inc., Charter Oak Blvd., West Hartford 1, Conn.

### Welding Equipment

A 20-page buyers' guide, GEC-1033, covers all types of welding equipment, electrodes and accessories. General Electric Co., Schenectady 5, N. Y.




**UNITED ENGINEERING AND FOUNDRY COMPANY**

PITTSBURGH, PENNSYLVANIA

*Plants at* Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington (Labdell United Division)

SUBSIDIARIES: Adamson United Company, Akron, Ohio
Stedman Foundry and Machine Company, Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

* including both plant and office personnel.

This amazing record of 24.6 years average service by plant *and* office personnel represents the skill and experience that produces the famous quality of Follansbee cold rolled strip.

Top quality control engineers guide this unmatched skill to obtain a product that meets rigid specifications—theirs *and yours.*

Add to this the service your Follansbee representative stands ready to give you and you'll realize why more and more manufacturers are turning to Follansbee for their cold rolled strip requirements.

# FOLLANSBEE

## STEEL CORPORATION

FOLLANSBEE, WEST VIRGINIA

**Cold Rolled Strip • Seamless Terne Roll Roofing • Polished Blue Sheets and Coils**

*Sales Offices in Principal Cities*

# STEEL Market Outlook

*June 18, 1956*

SOMETHING of a last minute rush to get in steel before the end of June is in evidence. This does not necessarily mean trade sentiment definitely anticipates a work stoppage at month end. It's still anyone's guess what'll happen when union and management cards are on the table for all to see.

But it does tend to confirm the view that consumers' stocks are not unduly large; and that fabricating operations, in all probability, will be quickly curtailed for lack of steel supply in event mill shipments are cut abruptly.

**CHANCES LIMITED**—Actually, there is little that buyers can do about getting in more of the major tonnage items before the end of the month. About their only chance is to follow up on shipments already promised them.

On some of the lesser items, orders can still be placed for nearby shipment. This is true of certain wire products and cold-finished bars.

**PRICE HEDGE**—As much as the threat of a strike and possible interruption in the flow of steel, the promise of higher prices this summer is motivating users' efforts to get in steel before the current quarter ends. Trade talk has it prices are due to go up $6 to $15 per ton, depending on how much wages and other worker benefits are hiked.

Currently, prices are holding steady. STEEL's composite on finished products is unchanged at $128.98. Scrap continues weak, the composite on the steelmaking grades now being down to $46 from a high of $55.33 around the end of April.

**SITUATION MIXED**—Demand pressure is varied as regards products and consuming industries. Requirements on automotive, appliance and farm implement accounts have been slowing down for some time. Within the last couple weeks pressure appears to have eased off from numerous miscellaneous consumers, especially for third quarter tonnage.

But pressure for shipments on heavy construction and machinery accounts and from the railroad car shops is unabated. No respite is in sight.

**SOME SLUGGISH**—With respect to the separate products, the light, flat-rolled items are moving noticeably slower than they did some time back. Interest in the third quarter lags, noticeably on automotive account. First noticed in cold-rolled sheets, demand is now more deliberate in stainless products, bars, wire and certain specialties.

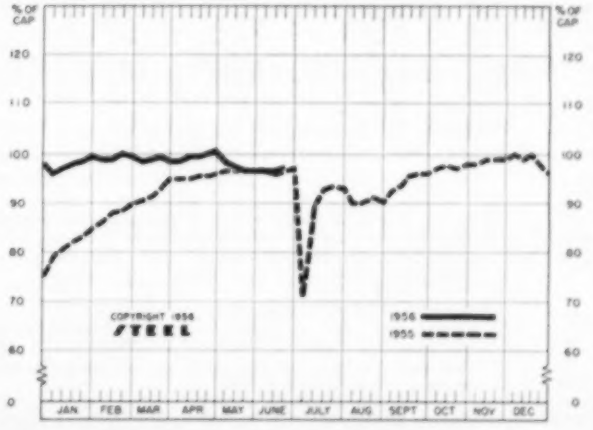
Structurals and plates continue in stringent supply. Structural awards are running 40 per cent ahead of volume a year ago. Reinforcing bar shipments in April, at 228,483 net tons, were record breaking.

**PRODUCTION**—Steelmaking operations last week went up ½-percentage point to 97 per cent of national ingot capacity. This was the first change in the production rate in about a month.

May output of steel ingots exceeded 10 million net tons for the eighth consecutive month.

**RECORD FIRST HALF**—Indications are that steel production in the first six months this year will exceed 63 million net tons. Never before in history has output attained such towering heights in a six-month period.

## NATIONAL STEELWORKS OPERATIONS




## DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

| | Week Ended June 17 | Change | Same Week 1955 | Same Week 1954 |
|---|---|---|---|---|
| Pittsburgh | 99.5 | + 0.5 | 100 | 70 |
| Chicago | 99.5 | + 0.5* | 97.5 | 83.5 |
| Mid-Atlantic | 98 | 0 | 95.5 | 59 |
| Youngstown | 101 | 0 | 98 | 72 |
| Wheeling | 100.5 | 0 | 95.5 | 82 |
| Cleveland | 103.5 | + 4.5* | 100 | 70 |
| Buffalo | 105 | 0 | 104.5 | 67.5 |
| Birmingham | 23.5 | 0 | 93.5 | 78 |
| New England | 88 | — 1 | 92 | 50 |
| Cincinnati | 92.5 | — 2 | 87 | 71 |
| St. Louis | 103 | + 8 | 106 | 72.5 |
| Detroit | 95.5 | + 0.5 | 93 | 75 |
| Western | 105 | — 1 | 108 | 85 |
| National Rate | 97 | + 0.5 | 96.5 | 73.5 |

## INGOT PRODUCTION‡

| | Week Ended June 17 | Week Ago | Month Ago | Year Ago |
|---|---|---|---|---|
| INDEX (1947-1949=100) | 148.0† | 148.2 | 146.0 | 144.2 |
| NET TONS (In thousands) | 2,378† | 2,389 | 2,345 | 2,316 |

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,461,893 in 1956; 2,413,278 in 1955; 2,386,549 in 1954.

*Metalworking Outlook—p. 91* *Technical Outlook—p. 147*

# Price Indexes and Composites

### FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

| | June 12 1956 | June 5 1956 | Month Ago | May Average |
|---|---|---|---|---|
| (1947-1949=100) | 158.2 | 158.2 | 158.0 | 158.1 |

### AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

**Week Ended June 12**

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

| | | | |
|---|---|---|---|
| Rails, Standard, No. 1 | $4.800 | Sheets, Electrical | $10.175 |
| Rails, Light, 40 lb | 6.217 | Strip, C.R., Carbon | 8.243 |
| Tie Plates | 5.625 | Strip, C.R., Stainless, 403 (lb) | 0.444 |
| Axles, Railway | 8.350 | Strip, H.R., Carbon | 5.606 |
| Wheels, Freight Car, 33 in. (per wheel) | 52.50 | Pipe, Black, Buttweld (100 ft) | 16.997 |
| Plates, Carbon | 5.200 | Pipe, Galv., Buttweld (100 ft) | 21.137 |
| Structural Shapes | 4.867 | Pipe, Line (100 ft) | 170.038 |
| Bars, Tool Steel, Carbon (lb) | 0.460 | Casing, Oil Well, Carbon (100 ft) | 165.120 |
| Bars, Tool Steel Alloy, Oil Hardening Die (lb) | 0.560 | Casing, Oil Well, Alloy (100 ft) | 256.030 |
| Bars, Tool Steel, H. R., Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb) | 1.185 | Tubes, Boiler (100 ft) | 41.530 |
| Bars, Tool Steel, H.R., Alloy, High Speed W 18, Cr 4, V 1 (lb) | 1.680 | Tubing, Mechanical, Carbon (100 ft) | 21.360 |
| Bars, H.R., Alloy | 9.475 | Tubing, Mechanical Stainless, 304 (100 ft) | 178.897 |
| Bars, H.R., Stainless, 303 (lb) | 0.450 | Tin plate, Hot-dipped, 1.25 lb | 9.333 |
| Bars, H.R., Carbon | 5.509 | Tin Plate, Electrolytic, 0.25 lb. | 8.033 |
| Bars, Reinforcing | 5.313 | Black Plate, Canmaking Quality | 7.133 |
| Bars, C.F., Carbon | 9.000 | Wire, Drawn, Carbon | 8.575 |
| Bars, C.F., Alloy | 12.375 | Wire, Drawn, Stainless, 430 (lb) | 0.590 |
| Bars, C.F., Stainless, 302 (lb) | 0.475 | Bale ties (bundle) | 6.537 |
| Sheets, H.R., Carbon | 5.345 | Nails, Wire, 8d Common | 8.595 |
| Sheets, C.R., Carbon | 6.214 | Wire, Barbed (80-rod spool) | 7.847 |
| Sheets, Galvanized | 7.770 | Woven Wire Fence (20-rod roll) | 18.635 |
| Sheets, C.R., Stainless, 302 (lb) | 0.599 | | |

### STEEL's FINISHED STEEL PRICE INDEX*

| | June 13 1956 | Week Ago | Month Ago | Year Ago | 5 Yrs. Ago |
|---|---|---|---|---|---|
| Index (1935-39 av.=100) | 210.45 | 210.45 | 210.45 | 194.53 | 171.92 |
| Index in cents per lb | 5.701 | 5.701 | 5.701 | 5.270 | 4.657 |

### STEEL's ARITHMETICAL PRICE COMPOSITES

| | | | | | |
|---|---|---|---|---|---|
| Finished Steel, NT* | $128.98 | $128.98 | $128.98 | $118.45 | $106.32 |
| No. 2 Fdry Pig Iron, GT | 60.27 | 60.27 | 60.27 | 56.54 | 52.54 |
| Basic Pig Iron, GT | 59.80 | 59.80 | 59.80 | 56.04 | 52.16 |
| Malleable Pig Iron, GT | 61.27 | 61.27 | 61.27 | 57.27 | 53.27 |
| Steelmaking Scrap, GT | 46.00 | 46.17 | 51.00 | 35.00 | 44.00 |

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

# Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

### FINISHED STEEL

| | June 13 1956 | Week Ago | Month Ago | Year Ago | 5 Yrs. Ago |
|---|---|---|---|---|---|
| Bars, H.R., Pittsburgh | 4.65 | 4.65 | 4.65 | 4.30 | 3.70 |
| Bars, H.R., Chicago | 4.65 | 4.65 | 4.65 | 4.30 | 3.70 |
| Bars, H.R., deld. Philadelphia | 4.93 | 4.93 | 4.93 | 4.55 | 4.20 |
| Bars, C.F., Pittsburgh | 6.25* | 6.25* | 6.25* | 5.40 | 4.55 |
| Shapes, Std., Pittsburgh | 4.60 | 4.60 | 4.60 | 4.25 | 3.65 |
| Shapes, Std., Chicago | 4.60 | 4.60 | 4.60 | 4.25 | 3.65 |
| Shapes, deld., Philadelphia | 5.00 | 5.00 | 5.00 | 4.53 | 3.91 |
| Plates, Pittsburgh | 4.50 | 4.50 | 4.50 | 4.225 | 3.70 |
| Plates, Chicago | 4.50 | 4.50 | 4.50 | 4.225 | 3.70 |
| Plates, Coatesville, Pa. | 4.80 | 4.80 | 4.80 | 4.225 | 4.15 |
| Plates, Sparrows Point, Md. | 4.50 | 4.50 | 4.50 | 4.225 | 3.70 |
| Plates, Claymont, Del. | 5.35 | 5.35 | 5.35 | 4.225 | 4.15 |
| Sheets, H.R., Pittsburgh | 4.325 | 4.325 | 4.325 | 4.05 | 3.60-3.75 |
| Sheets, H.R., Chicago | 4.325 | 4.325 | 4.325 | 4.05 | 3.60 |
| Sheets, C.R., Pittsburgh | 5.325 | 5.325 | 5.325 | 4.95 | 4.35 |
| Sheets, C.R., Chicago | 5.325 | 5.325 | 5.325 | 4.95 | 4.35 |
| Sheets, C.R., Detroit | 5.325-5.425 | 5.325-5.425 | 5.325-5.425 | 5.10 | 4.55 |
| Sheets, Galv., Pittsburgh | 5.85 | 5.85 | 5.85 | 5.45 | 4.80 |
| Strip, H.R., Pittsburgh | 4.325 | 4.325 | 4.325 | 4.05 | 3.75-4.00 |
| Strip, H.R., Chicago | 4.325 | 4.325 | 4.325 | 4.05 | 3.50 |
| Strip, C.R., Pittsburgh | 6.25 | 6.25 | 6.25 | 5.75 | 4.65-5.35 |
| Strip, C.R., Chicago | 6.25-6.35 | 6.25-6.35 | 6.25-6.35 | 5.85 | 4.90 |
| Strip, C.R., Detroit | 6.35 | 6.35 | 6.35 | 5.90 | 4.35-5.60 |
| Wire, Basic, Pittsburgh | 6.60 | 6.60 | 6.60 | 5.75 | 4.85-5.10 |
| Nails, Wire, Pittsburgh | 7.60 | 7.60 | 7.60 | 6.85 | 5.90-6.20 |
| Tin plate (1.50 lb), box, Pitts. | $9.85 | $9.85 | $9.85 | $9.05 | $8.70 |

*Including 0.35c for special quality

### SEMIFINISHED STEEL

| | | | | | |
|---|---|---|---|---|---|
| Billets, forging, Pitts. (NT) | $84.50 | $84.50 | $84.50 | $78.00 | $66.00 |
| Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts. | 5.375 | 5.375 | 5.375 | 4.675 | 4.10-4.30 |

### PIG IRON, Gross Ton

| | | | | | |
|---|---|---|---|---|---|
| Bessemer, Pitts. | $61.00 | $61.00 | $61.00 | $57.00 | $53.00 |
| Basic, Valley | 60.00 | 60.00 | 60.00 | 56.00 | 52.00 |
| Basic, deld. Phila. | 63.76 | 63.76 | 63.76 | 59.66 | 56.49 |
| No. 2 Fdry, Pitts. | 60.50 | 60.50 | 60.50 | 56.50 | 52.50 |
| No. 2 Fdry, Chicago | 60.50 | 60.50 | 60.50 | 56.50 | 52.50 |
| No. 2 Fdry, deld. Phila. | 64.26 | 64.26 | 64.26 | 55.16 | 56.99 |
| No. 2 Fdry, Birm. | 55.00 | 55.00 | 55.00 | 52.88 | 48.88 |
| No. 2 Fdry (Birm.) deld. Cin | 62.70 | 62.70 | 62.70 | 60.58 | 55.33 |
| Malleable, Valley | 60.50 | 60.50 | 60.50 | 56.50 | 52.50 |
| Malleable, Chicago | 60.50 | 60.50 | 60.50 | 56.50 | 52.50 |
| Ferromanganese, Duquesne | 215.00† | 215.00† | 215.00† | 190.00† | 188.00* |

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

### SCRAP, Gross Ton (Including broker's commission)

| | | | | | |
|---|---|---|---|---|---|
| No. 1 Heavy Melt, Pittsburgh | $44.50 | $44.50 | $49.50 | $34.50 | $45.00 |
| No. 1 Heavy Melt, E. Pa. | 47.50 | 48.00 | 54.00 | 36.50 | 43.50 |
| No. 1 Heavy Melt, Chicago | 46.00 | 46.00 | 49.50 | 34.00 | 43.50 |
| No. 1 Heavy Melt, Valley | 49.50 | 49.50 | 53.50 | 34.50 | 45.00 |
| No. 1 Heavy Melt, Cleve. | 47.50 | 47.50 | 49.50 | 31.50 | 44.00 |
| No. 1 Heavy Melt, Buffalo | 45.50 | 45.50 | 53.50 | 29.50 | 44.00 |
| Rails, Rerolling, Chicago | 69.50 | 69.50 | 72.50 | 51.50 | 52.50 |
| No. 1 cast, Chicago | 45.50 | 45.50 | 52.50 | 41.50 | 49.00 |

### COKE, Net Ton

| | | | | | |
|---|---|---|---|---|---|
| Beehive, Furn, Connisvl. | $14.125 | $14.125 | $14.125 | $13.75 | $14.75 |
| Beehive, Fdry, Connisvl. | 16.50 | 16.50 | 16.50 | 16.75 | 17.50 |
| Oven, Fdry, Chicago | 27.00 | 27.00 | 27.00 | 24.50 | 21.00 |

# Daily Nonferrous Price Record

| | June 13 Price | Last Change | Previous Price | May Avg. | Apr. Avg. | June 1955 Avg. |
|---|---|---|---|---|---|---|
| Copper | 40.00-46.00 | May 29, 1956 | 43.00-46.00 | 45.096 | 47.500 | 36.000 |
| Lead | 15.80 | Jan. 13, 1956 | 16.30 | 15.800 | 15.800 | 14.800 |
| Zinc | 13.50 | Jan. 6, 1956 | 13.00 | 13.500 | 13.500 | 12.250 |
| Tin | 94.50 | June 12, 1956 | 94.75 | 97.024 | 99.270 | 93.668 |
| Nickel | 64.50 | Nov. 24, 1954 | 60.00 | 64.500 | 64.500 | 64.500 |
| Aluminum | 25.90 | Mar. 29, 1956 | 24.40-25.90 | 25.900 | 25.900 | 23.200 |
| Magnesium | 33.75 | Apr. 16, 1956 | 32.50 | 33.750 | 33.150 | 28.500 |

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, pig, 99.8%, Velasco, Tex.

## What You Can Use the Markets Section for:

- **A source of price information.** Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.
- **A directory of producing points.** Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.
- **A source of price data for making your own comparisions.** Maybe you want to keep a continuous record of price spread between various forms of steel. You can get your base price information from STEEL's price tables.
- **A source of information on market trends.** Newsy items tell you about the supply-demand situation of materials, including iron and steel, nonferrous metals and scrap. Other articles analyze special situations of interest and importance to you.
- **Reports on iron and steel production, and materials and product shipments.**

# 300 one-ton precision forgings? Standard Steel makes them—fast!

Whatever your requirements are for forgings, large or small, we can make them to strictest specifications—and make them fast.

On a recent job for R. Hoe and Company, Inc., of New York, we made 300 one-ton cylinder forgings for printing presses. They were delivered on schedule, and measured up completely to the rigid specifications required for precision printing presses.

Hoe has standardized on Standard Steel cylinder forgings because:

- Cylinders are forged close to final tolerances, so expensive machining time is greatly reduced.
- Uniform grain structure of forged steel cylinders provides strength to hold the frequently-changed printing plates on the fast-revolving cylinders.
- Dimensional stability of forged steel cylinders assures that press operation will not be jeopardized by metal distortion.

Standard Steel Works can also furnish you with shafts, wheels, gear blanks, rings, flanges and special shapes. Next time you need forgings of any kind, and need them on time, get our quotation first. For your copy of bulletin 10,000, write Dept. 8846, Standard Steel Works Division, BLH Corporation, Burnham, Penna.

BALDWIN BLH LIMA-HAMILTON

**STANDARD STEEL WORKS DIVISION**
**BALDWIN-LIMA-HAMILTON**

DIVISIONS: Austin-Western • Eddystone • Hamilton • Electronics & Instrumentation • Lima • Madsen • Loewy-Hydropress • Pelton • Standard Steel Works

# Nonferrous Metals

**This industry has begun to show seasonal slumps. Zinc sales may not improve until August. Battery makers could give lead sales a boost in July**

Nonferrous Metal Prices, Pages 220 & 221

ZINC PRODUCTION and shipments showed the results of automotive cutbacks during May. The American Zinc Institute reports that production was 7426 tons below the April total.

Even with the sag in production and the increase in deliveries to U. S. stockpile (May, 10,196 tons; April, 4570 tons), stocks increased from 47,907 tons on May 1 to 59,577 tons at the beginning of June.

**Sales So-So**—Zinc producers report that sales are light to moderate. There is a growing feeling that users of galvanized steel have been stockpiling as insurance against a steel strike. If there is no strike, demand for galvanized products in July may fall to a low ebb. Automotive outlook: There will be few large orders before August.

**Lead sales are fair.** There is only a 50-50 chance that battery manufacturers will enter the market before July. Producers indicate that they are not concerned about low sales so long as the government is willing to enter the market for stockpile purchases. Says one lead man: "We are building up our stocks to more normal levels. They were too low during the last quarter of '55."

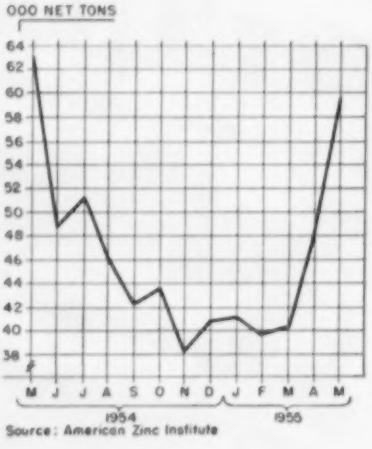
**Meanwhile**—The U. S. has initiated its barter program—agricultural commodities to foreign countries in exchange for lead and zinc. Tonnages obtained (authorization comes from the Agricultural Trade Development Assistance Act) will go to the U. S. supplemental stockpile. Consensus is that some 15,000 tons of lead and 25,000 tons of zinc have been offered to the U. S. The Office of Defense Mobilization discloses that the contract price cannot be higher than domestic prices for lead (16 cents a pound) and zinc (14 cents a pound). The foreign dealer must pay import duties, commissions and transportation costs. Materials going into the supplemental stockpile can't be released without congressional approval.

## Copper: Resistance Grows

Primary copper companies have opened their books for July, but users are attempting to act as though they aren't interested. Brass mills are putting on pressure in an effort to bring a quick price reduction (primary, 46 cents a pound). Meanwhile, mills are working off mushrooming inventories created by automotive cancellations.

The world price of copper seems to be closing in on the domestic

### SLAB ZINC STOCKS




Source: American Zinc Institute

smelters' quotation of 40 cents a pound. Early last week, the London Metal Exchange rallied to about 39 cents, following cuts by Belgian and African producers to 40.40 cents f.a.s. New York. The price spread is causing some wide differences of opinion, says I. J. Louis, manager, Metal Department, Bache & Co. He explains: "On a declining market, consumers who buy copper at a price to be determined at some future date cannot help but get the short end of the stick. The fabricator who buys his copper on such a basis must follow a similar pattern when selling his products, which means building uncertainty upon uncertainty . . ."

A copper spokesman comments: "It depends on which side of the fence you're on. Just a few weeks ago some said that the LME was a group of unfair dealers when its price went to 54.50 cents a pound. Now, the U. S. primary producers are catching it because they are keeping the price at the 46 cent a pound level. Primary producers still have to operate a business on a sound basis, not emotionalism."

Outlook: Primary producers will reduce copper prices below the 40 cent a pound mark only if they can settle the wage negotiations without a strike and calm the furor which will be created by the Chilean government when the price is reduced.

Brass mills will continue to voice displeasure, but will also keep on primary producers' books. They can't afford to turn to foreign suppliers who would drop them if European demand should take a sudden upsurge.

## Aluminum Sales Firm

There is enough aluminum to meet all needs, but not too much, claim primary producers. The only signs of weakness have come from Detroit and the appliance fields.

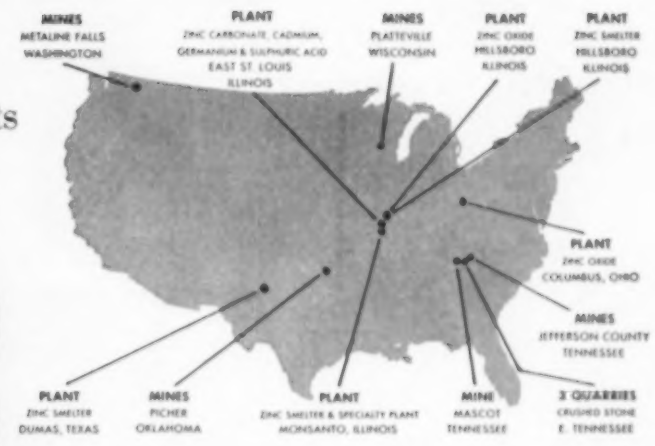
Reports continue to grow that the use of aluminum fin and brass tubing for radiators will become a reality on 1958 model cars. Corrosion tests, say aluminum engineers, indicate satisfactory performance. Results: This version may be followed by an all-aluminum radiator, predict aluminum experts.

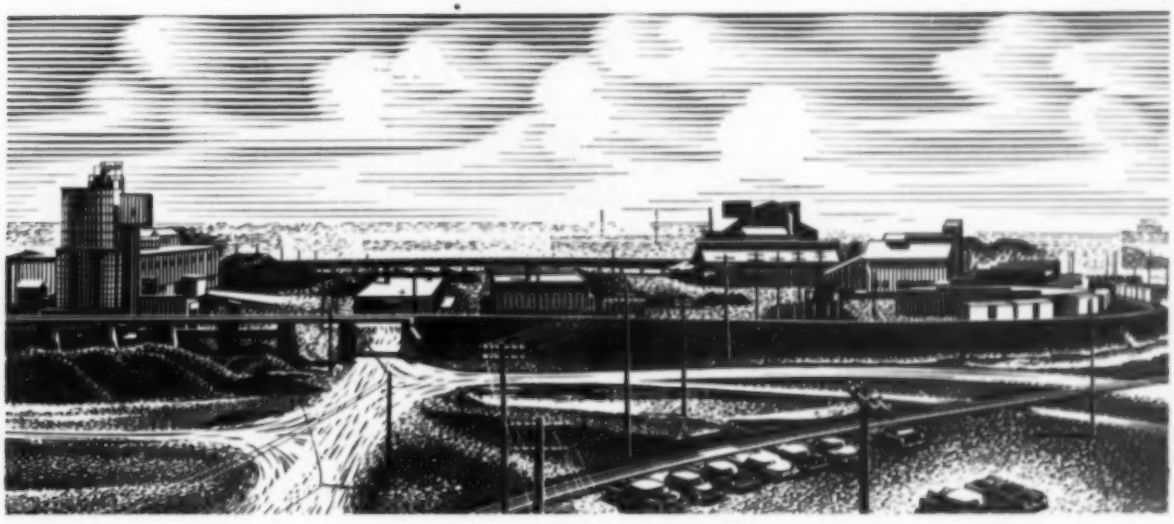
Outlook: Aluminum sales will remain high during the summer. There will be minor spurts as some users lay in additional inventory. The move will be in anticipation of moderate price increases which will come in August on the heels of any increased wages granted workers.

## Market Memos

- Magnesium and titanium sales continue to be strong. At current rates, both metals could enjoy a record year.
- Tin sales are moderate. Foreign demand remains off, and some domestic consumers, keeping one eye on the steel negotiations, are hesitating to enter the market for more than day to day needs.
- Congress passed the bill extending the life of the Texas City, Tex., tin smelter until Jan. 31, 1957. If the government can't find someone to buy the property before then, it's a good bet the plant will get another governmental reprieve.
- The Defense Minerals Exploration Administration will advance up to 75 per cent of the cost of selenium ore exploration projects. If deposits are exploited, the money must be paid back at the rate of 5 per cent of net sales.

# American Zinc and its products *from* A to Z



**ZINC OXIDE OPERATIONS AT COLUMBUS, OHIO**

Roasting operation: Zinc oxide manufacturing facilities producing lead-free zinc oxides for rubber, paint, ceramic, textile and chemical industries. Research and customer service laboratories are located here. For complete picture of American Zinc operations, see map above.

**PRODUCERS OF**

ALL GRADES OF SLAB ZINC
ZINC ANODES (Plating & Galvanic)
METALLIC CADMIUM
SULPHURIC ACID
LEAD-FREE and LEADED ZINC OXIDES
ZINC CARBONATE
GERMANIUM DIOXIDE
AGRICULTURAL LIMESTONE
CRUSHED STONE

*Distributors for*

**American Zinc sales Company**

AMERICAN ZINC, LEAD & SMELTING COMPANY

*Columbus, Ohio • Chicago • St. Louis • New York • Detroit • Pittsburgh*

# Nonferrous Metals

Cents per pound, carlots, except as otherwise noted

## PRIMARY METALS AND ALLOYS

**Aluminum:** 99 + %, ingots, 25.90; pigs, 24.00, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

**Aluminum Alloy:** No. 13, 12% Si, 27.70; No. 43, 5% Si, 27.50; No. 142, 4% Cu, 1.5% Mg, 2% Ni, 29.70; No. 195, 4.5% Cu, 0.8% Si, 29.30; No. 214, 3.8% Mg, 29.30; No. 356, 7% Si, 0.3% Mg, 27.70.

**Antimony:** R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.00-28.00, New York, duty paid, 10,000 lb or more.

**Beryllium:** 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

**Beryllium Aluminum:** 5% Be, $74.75 per lb of contained Be, f.o.b. Reading, Pa., Elmore, O.

**Beryllium Copper:** 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa., or Elmore, O.

**Bismuth:** $2.25 per lb ton lots.

**Cadmium:** Sticks and bars, $1.70 per lb deld.

**Cobalt:** 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

**Columbium:** Powder, $119.20 per lb, nom.

**Copper:** Electrolytic, 46.00 deld. Conn. valley; 46.00 deld. Midwest; custom smelters, 40.00 deld.; lake, 46.00 deld.; fire refined, 45.75 deld.

**Germanium:** First reduction, $201.85-$220 per lb; intrinsic grade, $220-$242.67 per lb, depending on quantity.

**Gold:** U. S. Treasury, $35 per oz.

**Indium:** 99.9%, $2.25 per troy oz.

**Iridium:** $100-$110 nom. per troy oz.

**Lead:** Common, 15.80; chemical, 15.90; corroding, 15.90, St. Louis. New York basis, add 0.20.

**Lithium:** 99 +, cups or ingots, $11.50; rod $13.50; shot or wire, $14.80, f.o.b. Minneapolis, 100 lb lots.

**Magnesium:** Pig, 33.75 f.o.b. Velasco, Tex.; ingot, 34.50 f.o.b. Velasco, Tex.

**Magnesium Alloys:** AZ91B (diecasting), 35.00 deld.; AZ63A, AZ92A, AZ91C (sand casting), 39.25 f.o.b. Velasco, Tex.

**Mercury:** Open market, spot, New York, $261-$263 per 76-lb flask.

**Molybdenum:** Powder, 99% hydrogen reduced, $3.20 per lb; pressed ingot, $4.06 per lb; sintered ingot, $5.53 per lb.

**Nickel:** Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 64.50; 10-lb pigs, unpacked, 67.65; "XX" nickel shot, 69.00; "P" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

**Osmium:** $80-$100 per troy oz. nom.

**Palladium:** $23-$24 per troy oz.

**Platinum:** $103-$110 per troy oz from refineries.

**Radium:** $16-$21.50 per mg radium content, depending on quantity.

**Rhodium:** $118-$125 per troy oz.

**Ruthenium:** $45-$55 per troy oz.

**Selenium:** 99.5%, $13.50-$15.50 per lb.

**Silver:** Open market, 90.75 per troy oz.

**Sodium:** 16.50, c.l.; 17.00, l.c.l.

**Tantalum:** Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

**Tellurium:** $1.50-$1.75 per lb.

**Thallium:** $12.50 per lb.

**Tin:** Straits, N. Y., spot 94.50; prompt, 94.375.

**Titanium:** Sponge, 99.3 + %, grade A-1 ductile (0.3% Fe max), $3.25; grade A-2 (0.5% Fe max), $2.95 per pound.

**Tungsten:** Powder, 98.8%, carbon reduced, 1000-lb lots, $4.50 per lb, nom, f.o.b. shipping point; less than 1000 lb add 15.00; 99 + % hydrogen reduced, $5.00. Treated ingot, $6.70.

**Zinc:** Prime Western, 13.50; brass special, 13.75; intermediate, 14.00, East St. Louis, freight allowed over 0.50 per pound. High grade, 14.85; special high grade, 15.25 deld. Diecasting alloy ingot No. 3, 18.00; No. 2, 19.00; No. 5, 18.50, deld.

**Zirconium:** Ingots, commercial grade, $14.40 per lb; low-halfnium reactor grade, $23.07. Sponge, commercial grade, $7.50-$10.00 per lb, depending on quantity; reactor grade, $14.00-$22.00 per lb, depending on quantity. Powder, electronics grade, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

## SECONDARY METALS AND ALLOYS

**Aluminum Ingot:** Piston ..... 23.75-25.00; No. 12 foundry alloy (No. 2 grade), 23.75-24.25; 5% silicon alloy, 0.60 Cu max, 25.50; 13 alloy, 0.60 Cu max, 25.25-25.50; 195 alloy, 25.75-26.00; 108 alloy, 24.00-24.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 24.00; grade 2, 23.25; grade 3, 22.50; grade 4, 22.00-22.50.

**Brass Ingot:** Red brass, No. 115, 37.00; tin bronze, No. 225, 49.50; No. 245, 43.00; high-leaded tin bronze, No. 305, 40.25; No. 1 yellow, No. 405, 30.75; manganese bronze, No. 421, 32.75.

**Magnesium Alloy Ingot:** AZ63A, 36.00; AZ91B, 36.00; AZ91C, 36.00; AZ92A, 36.00.

## NONFERROUS PRODUCTS

### BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy) Strip, $1.92; rod, bar, wire, $1.89.

### COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 51.355; l.c.l., 51.98. Weatherproof, 30,000-lb lots, 48.28; l.c.l., 49.03. Magnet wire deld., 15,000 lb or more, $58.68; l.c.l., 59.43.

### LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21.50 per cwt; pipe, full coils, $21.50 per cwt; traps and bends, list prices plus 30%.

### TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $12.60-$13.10; sheared mill plate, $10.00-$12.00; strip, $12.10-$12.60, wire, $9.00-$11.50; forging billets, $7.25-$7.50; hot-rolled and forged bars, $7.55-$7.80.

### ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 24.00; ribbon zinc in coils, 21.50; plates, 20.00.

### ZIRCONIUM

Plate, $22; H.R. strip, $19; C.R. strip, $29; forged or H.R. bars, $17; wire, 0.015 in., 1.00c per linear foot.

### NICKEL, MONEL, INCONEL

| | "A" Nickel | Monel | Inconel |
|---|---|---|---|
| Sheets, C.R. ..... | 102 | 83 | 99 |
| Strip, C.R. ..... | 102 | 92 | 125 |
| Plate, H.R. ..... | 97 | 87 | 95 |
| Rod, Shapes, H.R. .. | 87 | 74 | 93 |
| Seamless Tubes ..... | 122 | 110 | 153 |

### ALUMINUM

**Screw Machine Stock:** 30,000 lb base.

| Diam.(in.)or across flats | Round 2011-T3 | Round 2017-T4 | Hexagonal 2011-T3 | Hexagonal 2017-T4 |
|---|---|---|---|---|
| **Drawn** | | | | |
| 0.125 | 49.4 | 47.9 | ... | ... |
| 0.156-0.172 | 50.0 | 57.4 | ... | ... |
| 0.188 | 59.0 | 57.4 | ... | 73.2 |
| 0.219-0.234 | 56.0 | 54.4 | ... | ... |
| 0.250-0.281 | 56.0 | 54.4 | ... | 69.9 |
| 0.313 | 56.9 | 54.4 | ... | 68.7 |
| **Cold-finished** | | | | |
| 0.375-0.547 | 54.9 | 52.9 | 65.2 | 62.8 |
| 0.563-0.688 | 54.9 | 52.9 | 62.1 | 59.0 |
| 0.750-1.000 | 53.6 | 51.6 | 56.9 | 55.7 |
| 1.063 | 53.6 | 51.6 | ... | 53.8 |
| 1.125-1.500 | 51.6 | 49.7 | 55.1 | 53.5 |
| **Rolled** | | | | |
| 1.563 | 50.3 | 48.4 | ... | ... |
| 1.625-2.000 | 49.7 | 47.7 | ... | 52.9 |
| 2.125-2.500 | 48.5 | 46.5 | ... | ... |
| 2.563-3.375 | 47.1 | 45.1 | ... | ... |

### ALUMINUM

**Sheets and Circles:** 1100 and 3003 mill finish (30,000 lb base; freight allowed)

| Thickness Range Inches | Flat Sheet | Flat Sheet Circles* | Coiled Sheet | Coiled Sheet Circles† |
|---|---|---|---|---|
| 0.249-0.136 | 39.0 | 43.8 | ... | ... |
| 0.135-0.096 | 39.5 | 44.7 | 37.5 | 42.4 |
| 0.095-0.077 | 40.2 | 45.7 | 37.6 | 42.8 |
| 0.076-0.061 | 40.8 | 46.6 | 37.8 | 43.0 |
| 0.060-0.048 | 41.4 | 47.1 | 38.2 | 43.5 |
| 0.047-0.038 | 41.9 | 48.0 | 38.7 | 43.9 |
| 0.037-0.030 | 42.3 | 48.5 | 39.1 | 44.6 |
| 0.029-0.024 | 42.9 | 49.0 | 39.4 | 45.1 |
| 0.023-0.019 | 43.7 | 50.5 | 40.3 | 46.0 |
| 0.018-0.017 | 44.5 | ... | 40.9 | 46.9 |
| 0.016-0.015 | 45.4 | ... | 41.7 | 45.1 |
| 0.014 | 46.4 | ... | 42.7 | 49.4 |
| 0.013-0.012 | 47.6 | ... | 43.4 | 50.4 |
| 0.011 | 48.6 | ... | 44.6 | 52.0 |
| 0.010-0.0095 | 49.9 | ... | 45.8 | 53.7 |
| 0.009-0.0085 | 51.2 | ... | 47.3 | 55.8 |
| 0.008-0.0075 | 52.8 | ... | 48.5 | 57.4 |
| 0.007 | 54.3 | ... | 50.0 | 59.9 |
| 0.006 | 55.9 | ... | 51.4 | 64.9 |

*48 in. max diam. †26 in. max diam.

### ALUMINUM

**Plates and Circles:** Thickness 0.250-3 in., 24-60 in. width or diam, 72-240 in. lengths.

| Alloy | Plate Base | Circle Base |
|---|---|---|
| 1100-F, 3003-F .... | 38.0 | 42.3 |
| 5050-F ..... | 39.1 | 43.4 |
| 3004-F ..... | 40.1 | 45.3 |
| 5052-F ..... | 41.4 | 46.7 |
| 6061-T6 ..... | 42.6 | 47.5 |
| 2024-T4* ..... | 45.1 | 51.4 |
| 7075-T6* ..... | 52.9 | 60.0 |

*24-48 in. widths or diam, 72-180 lengths.

### ALUMINUM

**Forging Stock:** Round, Class 1, 40.60-51.60 in specific lengths 36-144 in. diameters 0.375-8 in. Rectangles and squares, Class 1, 44.50-57.70 in random lengths, 0.375-4 in. thick, width 0.750-10 in.

**Pipe:** ASA schedule 40, alloy 6063-T6, 20-ft length, plain ends, 90,000-lb base, per 100 ft.

| Nom. Pipe Size(in.) | | Nom. Pipe Size(in.) | |
|---|---|---|---|
| ⅛ | $17.45 | 2 | $ 53.55 |
| ¼ | 27.35 | 4 | 148.60 |
| ⅜ | 37.05 | 6 | 266.55 |
| ½ | 44.30 | 8 | 401.10 |

### MAGNESIUM

**Sheet and Plate:** AZ31A standard grade, .032 in., 100.00; .081 in., 75.00; .188 in., 66.50; .250-2.0 in., 65.60. AZ31A special grade, .032 in., 103.10; .081 in., 103.50; .188 in., 91.10; .250-2.0, 88.90. Tread plate, .188 in., 68.90; .250-2.0 in., 67.80. Tooling plate, .250-3.0 in., 70.20.

**Extruded Solid Shapes:**

| Factor | Com. Grade (FS) | Spec. Grade (AZ31B) |
|---|---|---|
| 6-8 | 66.40-69.00 | 81.40-84.00 |
| 12-14 | 67.50-69.60 | 82.50-84.60 |
| 24-26 | 72.10-72.70 | 87.10-87.70 |
| 36-38 | 84.90-85.80 | 99.90-100.80 |

## NONFERROUS SCRAP

### DEALERS BUYING PRICES

(Cents per pound, New York, in ton lots)

**Aluminum:** 1100 clippings, 14.50-15.00; old sheets, 10.50-11.00; borings and turnings, 6.00-7.00; crankcases, 10.50-11.00; industrial castings, 10.50-11.00.

**Copper and Brass:** No. 1 heavy copper and wire, 30.50-31.00; No. 2 heavy copper and wire, 28.00-28.50; light copper, 26.00-26.50; No. 1 composition red brass, 22.50-23.00; No. 1 composition turnings, 22.00-22.50; yellow brass

## BRASS MILL PRICES

MILL PRODUCTS a — SCRAP ALLOWANCES f

| | Sheet, Strip, Plate | Rod | Wire | Seamless Tube | Clean Heavy | Rod Ends | Clean Turnings |
|---|---|---|---|---|---|---|---|
| Copper ..... | 67.13b | 64.36c | .... | 67.32 | 42.000 | 42.000 | 41.250 |
| Yellow Brass ..... | 55.00 | 45.65d | 56.14 | 59.51 | 31.250 | 31.000 | 29.000 |
| Low Brass, 80% ..... | 60.15 | 60.00 | 60.69 | 62.98 | 35.375 | 35.125 | 34.625 |
| Red Brass, 85% ..... | 61.79 | 61.73 | 62.33 | 64.00 | 37.000 | 36.750 | 36.250 |
| Com. Bronze, 90% ..... | 63.08 | 63.92 | 64.52 | 66.54 | 38.500 | 38.250 | 37.750 |
| Manganese Bronze ..... | 62.65 | 56.76 | 67.00 | .... | 28.875 | 28.625 | 28.125 |
| Muntz Metal ..... | 56.94 | 52.75 | .... | .... | 29.125 | 28.875 | 28.375 |
| Naval Brass ..... | 58.84 | 53.15 | 65.90 | 62.06 | 28.875 | 28.625 | 28.125 |
| Silicon Bronze ..... | 70.45 | 69.67 | 70.52 | 75.59e | 40.750 | 40.500 | 39.750 |
| Nickel Silver, 10% ..... | 70.14 | 72.49g | 72.49 | .... | 35.625 | 35.375 | 17.813 |
| Phos. Bronze, A, 5% ... | 84.92 | 85.42 | 85.42 | 86.60 | 42.125 | 41.875 | 40.875 |

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded

turnings, 13.00-13.50; new brass clippings, 22.50-23.00; light brass, 14.50-15.00; heavy yellow brass, 15.50-16.00; new brass rod ends, 20.50-21.00; auto radiators, unsweated, 16.50-17.00; cocks and faucets, 19.50; brass pipe, 18.00-18.50.

**Lead:** Heavy, 12.50-12.75; battery plates, 6.50-6.75; linotype and stereotype, 13.50-14.00; electrotype, 12.75-13.00; mixed babbitt, 14.50.

**Monel:** Clippings, 85.00-90.00; old sheets, 85.00-80.00; turnings 65.00-70.00; rods, 85.00-90.00

**Nickel:** Sheets and clips, 100.00-200.00; rolled anodes, 100.00-200.00; turnings, 85.00-185.00; rod ends, 100.00-200.00.

**Zinc:** Old zinc, 5.00-5.50; new die-cast scrap, 4.00-4.50; old die-cast scrap, 3.00.

### REFINER'S BUYING PRICES

(Cents per pound, carlots, delivered refinery)

**Aluminum:** 1100 clippings, 17.50-18.25; 3003 clippings, 17.50-18.00; 6151 clippings, 17.50-18.00; 5052 clippings, 17.50-18.00; 2014 clippings, 16.50-17.50; 2017 clippings, 16.50-17.50; 2024 clippings, 16.50-17.50; mixed clippings, 16.50; old sheet, 14.50-15.00; old cast, 14.50-15.00; clean old cable (free of steel), 16.75-17.50; borings and turnings, 14.50-15.50.

**Beryllium Copper:** Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 62.00; light scrap, 63.00; turnings and borings, 48.00.

**Copper and Brass:** No. 1 heavy copper and wire, 34.00; No. 2 heavy copper and wire, 32.50; light copper, 30.25; refinery brass (60% copper) per dry copper content, 28.00-28.50.

### INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

**Copper and Brass:** No. 1 heavy copper and wire, 34.00; No. 2 heavy copper and wire, 32.50; light copper, 30.25; No. 1 composition borings, 26.00; No. 1 composition solids, 26.50; heavy yellow brass solids, 18.00; yellow brass turnings, 17.00; radiators, 20.50.

## PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

### ANODES

**Cadmium:** Special or patented shapes, $1.70 per lb.

**Copper:** Flat-rolled, 63.79; oval, 62.92, 5000-10,000 lb; electrodeposited, 57.78, 2000-5000 lb lots; cast, 58.64-59.54, 5000-10,000 lb quantities.

**Nickel:** Depolarized, less than 100 lb, $1.015; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb. All prices eastern delivery, effective Jan. 1, 1955.

**Tin:** Bar or slab, less than 200 lb, 113.50; 200-499 lb, 112.00; 500-999 lb, 111.50; 1000 lb or more, 111.00.

**Zinc:** Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

### CHEMICALS

**Cadmium Oxide:** $2.15 per lb, in 100-lb drums.

**Chromic Acid:** Less than 10,000 lb, 28.50; over 10,000 lb, 27.50.

**Copper Cyanide:** 100 lb, 85.25; 200 lb, 84.50; 300 lb, 84.25; 400-900 lb, 83.50; 1000 lb, 81.50.

**Copper Sulphate:** 500-1900 lb, 17.90; 2000-5900 lb, 15.90; 6000 lb or more, 15.65.

**Nickel Chloride:** 100 lb, 46.50; 200 lb, 44.50; 300 lb, 43.50; 400-4900 lb, 41.50; 5000-9900 lb, 39.50; 10,000 lb and over, 38.50. All prices eastern delivery, effective Jan. 1, 1955.

**Nickel Sulphate:** 100 lb, 38.25; 200 lb, 36.25; 300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 31.25; 36,000 lb, 30.35. All prices eastern delivery, effective Jan. 1, 1955.

**Silver Cyanide:** (Cents per ounce) 4-oz bottle, 86.875; 15-oz bottle, 85.625; 80-oz bottle, 83.125; 100-oz bottle, 83.125; f.o.b. St. Louis, New York and Los Angeles. Effective Sept. 30, 1955.

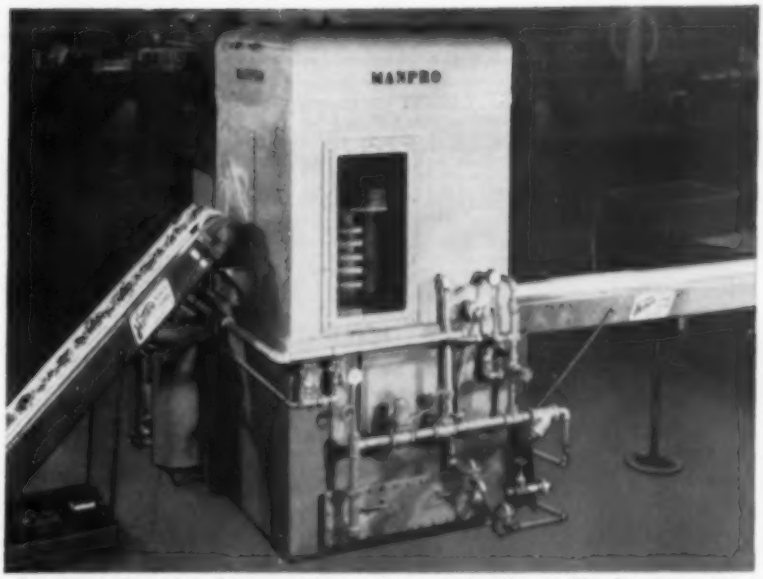
**Sodium Cyanide:** Egg, under 1000 lb, 19.80; 1000-19,900 lb, 18.80; 20,000 lb, and over, 17.80; granular, add 1-cent premium to above.

**Sodium Stannate:** Less than 100 lb, 58.90; 100-600 lb, 60.70; 700-1900 lb, 58.20; 2000-9900 lb, 56.50; 10,000 lb or more, 55.30.

**Stannous Chloride (anhydrous):** Less than 25 lb, 165.30; 25 lb, 130.30; 100 lb, 115.30; 400 lb, 112.90; 5200-19,600 lb, 100.70; 20,000 lb or more, 88.50.

**Stannous Sulphate:** Less than 50 lb, 128.10; 50 lb, 96.10; 100-1900 lb, 96.10; 2000 lb or more, 94.10.

**Zinc Cyanide:** Under 1000 lb, 54.30; 1000 lb and over, 52.30.


Two Homer "Space Saver" Magnetic Conveyors in use with a Manpro Vibra Degreaser—one feeds screws into the Vibra Degreaser . . . the other receives them to discharge into tote boxes. Even though these cylindrical pieces are conveyed up a steep incline, there is no slipping, rolling or loss of pieces.

**TEN ANSWERS TO CRITICAL QUESTIONS ABOUT HOMER MAGNETIC CONVEYORS**

**MAGNETIC ASSEMBLIES**
Greater magnetic strength per unit length, permits faster belt speeds (up to 250 fpm) at steeper angles (up to 90°). Increases automatic handling of parts without damage to critical finishes, caused by parts hitting or bumping each other . . . ends slipping and loss of parts because of steep inclines, belt resiliency or bouncing over belt cleats.

**HEAD PULLEY**
Head pulley at discharge end of conveyor contains an adjustable, permanently magnetized assembly (Patent Pending) . . . requires no nosed-over section for delivery of parts to tote boxes, machines or other conveying equipment.

**BELTS**
No special belts, cleats or buckets required. If belt replacement is needed, a standard stock belt can be purchased from a local supply source.

**FLEXIBILITY**
Can be supplied to convey horizontally or vertically (90°). Custom built to convey on underside of conveyor for parts turn-over jobs . . . Custom built for parts rejection . . . Custom built for multi-story conveying and many other unusual applications.

**FLOOR PICK UP**
If the application requires floor pick up, the "Space Saver" can be supplied with a magnetically energized tail pulley for this purpose.

**LOADING**
The "Space Saver" can be supplied to pick up pieces from floor, or can be loaded at any desired height above floor . . . does not require hopper or side boards in most applications. These can be supplied if desired.

**DRIVE**
Positive chain drive with choice of gearhead or separate motor and speed reducer.

**SAFETY**
Drive mounting on standard units designed for maximum safety to workers.

**MAINTENANCE AND REPAIR**
Wherever possible, standard component parts which can be purchased locally if desired have been incorporated into the "Space Saver."

**SIZES**
A full range of standard sizes (85 by count), with belt widths from 6" to 24" and 4' to 20' belt centers. Custom models available to suit your specifications.

**It costs you nothing to get expert advice on your magnetic conveying problems through Homer's recommendations—get the complete Homer "Space Saver" Magnetic Conveyor story today . . . Remember, Homer backs up its "Space Saver" recommendations . . . to your satisfaction.**

**Send for bulletin MC-250 which describes and explains the Homer "Space Saver" Magnetic Conveyor line.**

**THE HOMER MANUFACTURING CO., INC.**
**DEPT. 149** **LIMA, OHIO**

HOMER FIRST IN INDUSTRIAL PERMANENT MAGNETIC CONVEYORS

# Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 223; to footnotes, page 225.

## SEMIFINISHED

**INGOTS, Carbon, Forging (NT)**
Munhall,Pa. U5 ..... $65.50

**INGOTS, Alloy (NT)**
Detroit R7 ..... $69.00
Houston 85 ..... 74.00
Midland,Pa. C18 ..... 69.00
Munhall,Pa. U5 ..... 69.00

**BILLETS, BLOOMS & SLABS**

**Carbon, Rerolling (NT)**
Aliquippa,Pa. J5 ..... $68.50
Bessemer,Pa. U5 ..... 68.50
Bridgeport,Conn. N19 .. 73.50
Buffalo R2 ..... 68.50
Clairton,Pa. U5 ..... 68.50
Ensley,Ala. T2 ..... 68.50
Fairfield,Ala. T2 ..... 68.50
Fontana,Calif. K1 ..... 78.00
Gary,Ind. U5 ..... 68.50
Johnstown,Pa. B2 ..... 68.50
Lackawanna,N.Y. B2 .. 68.50
LoneStar,Tex. L6 ..... 74.50
Munhall,Pa. U5 ..... 68.50
Pittsburgh J5 ..... 68.50
S.Chicago,Ill. R2, U5 .. 68.50
S.Duquesne,Pa. U5 .... 68.50
Youngstown R2 ..... 68.50

**Carbon, Forging (NT)**
Aliquippa,Pa. J5 ..... $84.50
Bessemer,Pa. U5 ..... 84.50
Bridgeport,Conn. N19 .. 89.50
Buffalo R2 ..... 84.50
Canton,O. R2 ..... 86.50
Clairton,Pa. U5 ..... 84.50
Conshohocken,Pa. A3 .. 89.50
Ensley,Ala. T2 ..... 84.50
Fairfield,Ala. T2 ..... 84.50
Fontana,Calif. K1 ..... 94.00
Gary,Ind. U5 ..... 84.50
Geneva,Utah C11 ..... 84.50
Houston 85 ..... 101.00
Johnstown,Pa. B2 ..... 84.50
Lackawanna,N.Y. B2 .. 84.50
LosAngels B3 ..... 94.00
Midland,Pa. C18 ..... 84.50
Munhall,Pa. U5 ..... 84.50
Pittsburgh J5 ..... 84.50
Seattle B3 ..... 98.00
S.Chicago R2,U5,W14 .. 84.50
S.Duquesne,Pa. U5 .... 84.50
S.SanFrancisco B3 .... 94.00

**Alloy, Forging (NT)**
Bethlehem,Pa. B2 .... $96.00
Buffalo R2 ..... 96.00
Canton,O. R2, T7 ..... 96.00
Conshohocken,Pa. A3 .. 103.00
Detroit R7 ..... 96.00
Fontana,Calif. K1 ..... 117.00
Gary,Ind. U5 ..... 96.00
Houston 85 ..... 105.00
Ind.Harbor,Ind. Y1 .... 96.00
Johnstown,Pa. B2 ..... 96.00
Lackawanna,N.Y. B2 .. 96.00
LosAngeles B3 ..... 116.00
Massillon,O. R2 ..... 96.00
Midland,Pa. C18 ..... 96.00
Munhall,Pa. U5 ..... 96.00
S.Chicago R2,U5,W14 .. 96.00
S.Duquesne,Pa. U5 .... 96.00
Struthers,O. Y1 ..... 96.00
Warren,O. C17 ..... 96.00

**ROUNDS, SEAMLESS TUBE (NT)**
Buffalo R2 ..... $103.50
Canton,O. R2 ..... 103.50
Cleveland R2 ..... 103.50
Gary,Ind. U5 ..... 103.50
S.Chicago R2, W14 .... 103.50
S.Duquesne,Pa. U5 .... 103.50

**SKELP**
Aliquippa,Pa. J5 ..... 4.325
LoneStar,Tex. L6 ..... 4.625
Munhall,Pa. U5 ..... 4.225
SparrowsPoint,Md. B2 .. 4.225
Warren,O. R2 ..... 4.225
Youngstown R2, U5 .... 4.225

**WIRE RODS**
AlabamaCity,Ala. R2 .. 5.375
Aliquippa,Pa. J5 ..... 5.375
Alton,Ill. L1 ..... 5.55
Buffalo W12 ..... 5.375
Cleveland A7 ..... 5.375
Donora,Pa. A7 ..... 5.375
Fairfield,Ala. T2 ..... 5.375
Houston 85 ..... 5.625
IndianaHarbor,Ind. Y1 .. 5.375
Johnstown,Pa. B2 ..... 5.375
Joliet,Ill. A7 ..... 5.375
KansasCity,Mo. 85 .... 5.625
Kokomo,Ind. C16 ..... 5.475
Los Angeles B3 ..... 6.175
Minnequa,Colo. C10 .... 5.625
Monessen,Pa. P7 ..... 5.375
N.Tonawanda,N.Y. B11 .. 5.375
Pittsburg,Calif. C11 .. 6.025
Portsmouth,O. P12 .... 5.375
Roebling,N.J. R5 ..... 5.475
S.Chicago,Ill. R2 ..... 5.375
SparrowsPoint,Md. B2 .. 5.475
Sterling,Ill.(1) N15 .... 5.375
Sterling,Ill. N15 ..... 5.475
Struthers,O. Y1 ..... 5.375
Worcester,Mass. A7 .... 5.675

## STRUCTURALS

**Carbon Steel Std. Shapes**
Ala.City,Ala. R2 ..... 4.60
Aliquippa,Pa. J5 ..... 4.60
Bessemer,Ala. T2 ..... 4.60
Bethlehem,Pa. B2 ..... 4.65
Birmingham C15 ..... 5.10
Clairton,Pa. U5 ..... 4.60
Fairfield,Ala. T2 ..... 4.60
Fontana,Calif. K1 ..... 5.30
Gary,Ind. U5 ..... 4.60
Geneva,Utah C11 ..... 4.60
Houston 85 ..... 4.70
Ind.Harbor,Ind. I-2 .... 4.60
Johnstown,Pa. B2 ..... 4.65
KansasCity,Mo. 85 .... 4.70
Lackawanna,N.Y. B2 .... 4.65
LosAngeles B3 ..... 5.30
Minnequa,Colo. C10 .... 4.90
Munhall,Pa. U5 ..... 4.60
Niles,Calif. P1 ..... 5.25
Phoenixville,Pa. P4 .... 5.15
Portland,Oreg. O4 ..... 5.35
Seattle B3 ..... 5.35
S.Chicago U5, W14 .... 4.60
S.SanFrancisco B3 .... 5.25
Torrance,Calif. C11 .... 5.30
Weirton,W.Va. W6 ..... 4.60

**Wide Flange**
Bethlehem,Pa. B2 ..... 4.65
Clairton,Pa. U5 ..... 4.60
Fontana,Calif. K1 ..... 5.45
Lackawanna,N.Y. B2 .... 4.65
Munhall,Pa. U5 ..... 4.60
Phoenixville,Pa. P4 .... 5.15
S.Chicago,Ill. U5 ..... 4.60

**Alloy Std. Shapes**
Clairton,Pa. U5 ..... 5.65
Fontana,Calif. K1 ..... 7.40
Gary,Ind. U5 ..... 5.65
Houston 85 ..... 5.75
Munhall,Pa. U5 ..... 5.65
S.Chicago,Ill. U5 ..... 5.65

**H.S., L.A. Std. Shapes**
Aliquippa,Pa. J5 ..... 6.75
Bessemer,Ala. T2 ..... 6.75
Bethlehem,Pa. B2 ..... 6.80
Clairton,Pa. U5 ..... 6.75
Fairfield,Ala. T2 ..... 6.75
Fontana,Calif. K1 ..... 7.45
Gary,Ind. U5 ..... 6.75
Geneva,Utah C11 ..... 6.75
Houston 85 ..... 6.85
Ind.Harbor,Ind. I-2, Y1 .. 6.75
Johnstown,Pa. B2 ..... 6.80
KansasCity,Mo. 85 .... 6.85
Lackawanna,N.Y. B2 .... 6.80
LosAngeles B3 ..... 7.45
Munhall,Pa. U5 ..... 6.75
Seattle B3 ..... 7.50
S.Chicago,Ill. U5, W14 .. 6.75
S.SanFrancisco B3 .... 7.40
Struthers,O. Y1 ..... 6.75

**H.S., L.A. Wide Flange**
Bethlehem,Pa. B2 ..... 6.80
Lackawanna,N.Y. B2 .... 6.80
Munhall,Pa. U5 ..... 6.75
S.Chicago,Ill. U5 ..... 6.75

## PILING

**BEARING PILES**
Bethlehem,Pa. B2 ..... 4.65
Lackawanna,N.Y. B2 .... 4.65
Munhall,Pa. U5 ..... 4.60
S.Chicago,Ill. U5 ..... 4.60

**STEEL SHEET PILING**
Ind.Harbor,Ind. I-2 .... 5.45
Lackawanna,N.Y. B2 .... 5.45
Munhall,Pa. U5 ..... 5.45
S.Chicago,Ill. U5 ..... 5.45

## PLATES

**PLATES, Carbon Steel**
Ala.City,Ala. R2 ..... 4.50
Aliquippa,Pa. J5 ..... 4.50
Ashland,Ky.(15) A10 .. 4.50
Bessemer,Ala. T2 ..... 4.50
Bridgeport,Conn. N19 .. 4.75
Buffalo R2 ..... 4.50
Clairton,Pa. U5 ..... 4.50
Claymont,Del. C22 ..... 5.35
Cleveland J5, R2 ..... 4.60
Coatesville,Pa. L7 ..... 4.80
Conshohocken,Pa. A3 .... 4.50
Detroit M1 ..... 4.60
Ecorse,Mich. G5 ..... 4.60
Fairfield,Ala. T2 ..... 4.50
Fontana,Calif.(30) K1 .. 5.20
Gary,Ind. U5 ..... 4.50
Geneva,Utah C11 ..... 4.50
GraniteCity,Ill. G4 .... 4.70
Harrisburg,Pa. P4 ..... 5.10
Houston 85 ..... 4.60
Ind.Harbor,Ind. I-2, Y1 .. 4.50
Johnstown,Pa. B2 ..... 4.50
Lackawanna,N.Y. B2 .... 4.50
LoneStar,Tex. L6 ..... 4.85
Mansfield,O. E6 ..... 4.50
Minnequa,Colo. C10 .... 5.35
Munhall,Pa. U5 ..... 4.50
Newport,Ky. N9 ..... 4.50
Pittsburgh J5 ..... 4.50
Riverdale,Ill. A1 ..... 4.725
Seattle B3 ..... 5.40
Sharon,Pa. S3 ..... 4.50
S.Chicago R2, U5, W14 .. 4.50
SparrowsPoint,Md. B2 .. 4.50
Steubenville,O. W10 .... 4.50
Warren,O. R2 ..... 4.50
Weirton,W.Va. W6 ..... 4.50
Youngstown R2, U5, Y1 .. 4.50

**PLATES, Carbon Abras. Resist.**
Claymont,Del. C22 ..... 6.20
Fontana,Calif. K1 ..... 6.35
Geneva, Utah C11 ..... 5.65
Johnstown,Pa. B2 ..... 5.65
SparrowsPoint,Md. B2 .. 5.65

**PLATES, Wrought Iron**
Economy,Pa. B14 ..... 10.40

**PLATES, High-Strength Low-Alloy**
Aliquippa,Pa. J5 ..... 6.725
Bessemer,Ala. T2 ..... 6.725
Clairton,Pa. U5 ..... 6.725
Cleveland J5, R2 ..... 6.725
Claymont,Del. C22 ..... 6.725
Coatesville,Pa. L7 ..... 7.025
Conshohocken,Pa. A3 .. 6.725
Ecorse,Mich. G5 ..... 6.825
Fairfield,Ala. T2 ..... 6.725
Fontana,Calif.(30) K1 .. 7.425
Gary,Ind. U5 ..... 6.725
Geneva,Utah C11 ..... 6.725
Houston 85 ..... 6.825
Ind.Harbor,Ind. I-2, Y1 .. 6.725
Johnstown,Pa. B2 ..... 6.725
Munhall,Pa. U5 ..... 6.725
Pittsburgh J5 ..... 6.725
Seattle B3 ..... 7.625
Sharon,Pa. S3 ..... 6.725
S.Chicago,Ill. U5, W14 .. 6.725
SparrowsPoint,Md. B2 .. 6.725
Warren,O. R2 ..... 6.725
Youngstown U5, Y1 .... 6.725

**PLATES, Alloy**
Bridgeport,Conn. N19 .. 6.55
Claymont,Del. C22 ..... 6.30
Coatesville,Pa. L7 ..... 6.30
Fontana,Calif. K1 ..... 7.00
Gary,Ind. U5 ..... 6.30
Houston 85 ..... 6.40
Ind.Harbor,Ind. Y1 .... 6.30
Johnstown,Pa. B2 ..... 6.30
Munhall,Pa. U5 ..... 6.30
Newport,Ky. N9 ..... 6.30
Seattle B3 ..... 7.20
Sharon,Pa. S3 ..... 6.30
S.Chicago,Ill. U5, W14 .. 6.30
SparrowsPoint,Md. B2 .. 6.30
Youngstown Y1 ..... 6.30

**FLOOR PLATES**
Cleveland J5 ..... 5.575
Conshohocken,Pa. A3 .. 5.575
Harrisburg,Pa. P4 ..... 5.575
Ind.Harbor,Ind. I-2 .... 5.575
Munhall,Pa. U5 ..... 5.575
S.Chicago,Ill. U5 ..... 5.575

**PLATES, Ingot Iron**
Ashland c.l. (15) A10 .. 4.75
Ashland l.c.l. (15) A10 .. 5.25
Cleveland c.l. R2 ..... 5.10
Warren,O. c.l. R2 ..... 5.10

## BARS

**BARS, Hot-Rolled Carbon (Merchant Quality)**
Ala.City,Ala.(9) R2 .... 4.65
Aliquippa,Pa.(9) J5 .... 4.65
Alton,Ill. L1 ..... 4.85
Atlanta(9) A11 ..... 5.15
Bessemer,Ala.(9) T2 .... 4.65
Birmingham C15 ..... 5.15
Bridgeport,Conn. N19 .. 4.80
Buffalo(9) R2 ..... 4.65
Canton,O.(9) R2 ..... 4.75
Clairton,Pa.(9) U5 .... 4.65
Cleveland(9) R2 ..... 4.65
Ecorse,Mich.(9) G5 .... 4.75
Emeryville,Calif. J7 .... 5.40
Fairfield,Ala.(9) T2 .... 4.65
Fairless,Pa.(9) U5 .... 4.50
Fontana,Calif. K1 ..... 5.35
Gary,Ind.(9) U5 ..... 4.65
Houston(9) 85 ..... 4.90
Ind.Harbor,Ind.(9) I-2. 4.65
Ind.Harbor,Ind. Y1 .... 4.65
Johnstown,Pa.(9) B2 .... 4.65
Joliet,Ill. P22 ..... 5.15
KansasCity,Mo.(9) 85 .. 4.90
Lackawanna(9) B2 ..... 4.65
LosAngeles(9) B3 ..... 5.35
Massillon,O.(9) R2 .... 4.75
Midland,Pa.(9) C18 .... 4.65
Milton,Pa. M18 ..... 4.80
Minnequa,Colo. C10 .... 5.10
Niles,Calif. P1 ..... 5.35
N.Tonawanda,N.Y.(9) B11 4.65
Pittsburg,Calif.(9) C11 . 5.35
Pittsburgh(9) J5 ..... 4.65
Portland,Oreg. O4 ..... 5.40
Seattle B3, N14 ..... 5.40
S.Chicago W14 ..... 4.65
S.Chicago,Ill.(9) R2, U5 4.65
S.Duquesne,Pa.(9) U5 .. 4.65
S.SanFran.,Calif.(9) B3 .5.40
Sterling,Ill.(1) N15 .... 4.65
Sterling,Ill. N15 ..... 4.75
Struthers,O. Y1 ..... 4.65
Torrance,Calif.(9) C11 .. 5.35
Warren,O.(9) R2 ..... 4.65
Weirton,W.Va.(9) W6 .... 4.65
Youngstown(9) R2, U5 .... 4.65

**BARS, H.R. Leaded Alloy**
Warren,O. C17 ..... 6.575

**BARS, Hot-Rolled Alloy**
Bethlehem,Pa. B2 ..... 5.575
Bridgeport,Conn. N19 .. 5.725
Buffalo R2 ..... 5.575
Canton,O. R2, T7 ..... 5.575
Clairton,Pa. U5 ..... 5.575
Detroit R7 ..... 5.575
Ecorse,Mich.G5 ..... 5.675
Fairless,Pa. U5 ..... 5.725
Fontana,Calif. K1 ..... 6.625
Gary,Ind. U5 ..... 5.575
Houston 85 ..... 5.825
Ind.Harbor,Ind. I-2, Y1 .5.575
Johnstown,Pa. B2 ..... 5.575
KansasCity,Mo. 85 .... 5.825
Lackawanna,N.Y. B2 .... 5.575
LosAngeles B3 ..... 6.625
Massillon,O. R2 ..... 5.575
Midland,Pa. C18 ..... 5.575
S.Chicago R2, U5, W14 .5.575
S.Duquesne,Pa. U5 .... 5.575
Struthers,O. Y1 ..... 5.575
Warren,O. C17 ..... 5.575
Youngstown U5 ..... 5.575

**BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy**
Aliquippa,Pa. J5 ..... 6.80
Bessemer,Ala. T2 ..... 6.80
Bethlehem,Pa. B2 ..... 6.80
Clairton,Pa. U5 ..... 6.80
Cleveland R2 ..... 6.80
Ecorse,Mich. G5 ..... 6.90
Fairfield,Ala. T2 ..... 6.80
Fontana,Calif. K1 ..... 7.50
Gary,Ind. U5 ..... 6.80
Houston 85 ..... 7.05
Ind.Harb.,Ind. I-2, Y1 .. 6.80
Johnstown,Pa. B2 ..... 6.80
KansasCity,Mo. 85 .... 7.05
Lackawanna,N.Y. B2 .... 6.80
LosAngeles B3 ..... 7.50
Pittsburgh J5 ..... 6.80
Seattle B3 ..... 7.55
S.Chicago W14 ..... 6.80
S.Duquesne,Pa. U5 .... 6.80
S.SanFrancisco B3 .... 7.55
Struthers,O. Y1 ..... 6.80
Warren,O. R2 ..... 6.80
Youngstown U5 ..... 6.80

**BAR SIZE ANGLES, H.R. Carbon**
Bethlehem,Pa.(9) B2 .... 4.80
Lackawanna(9) B2 ..... 4.65

**BAR SIZE ANGLES, S. Shapes**
Aliquippa,Pa. J5 ..... 4.65
Atlanta A11 ..... 5.15
Fontana,Calif. K1 ..... 5.35
Joliet,Ill. P22 ..... 5.10
Niles,Calif. P1 ..... 5.25
Pittsburgh J5 ..... 4.65
Portland,Oreg. O4 ..... 5.40
SanFrancisco S7 ..... 5.05

**BAR SHAPES, Hot-Rolled Alloy**
Clairton,Pa. U5 ..... 5.65
Gary,Ind. U5 ..... 5.65
Houston 85 ..... 5.90
KansasCity,Mo. 85 .... 5.90
Youngstown U5 ..... 5.65

**BARS, C.F. Loaded Alloy**
Ambridge,Pa. W18 .... 8.325
Camden,N.J. P13 ..... 8.35
Chicago W18 ..... 8.325
Cleveland C20 ..... 8.325
Monaca,Pa. S17 ..... 8.325
Newark,N.J. W18 ..... 8.50
SpringCity,Pa. K3 ..... 8.30
Warren,O. C17 ..... 8.575

**BARS, Cold-Finished Carbon**
Ambridge,Pa. W18 ..... 6.25
BeaverFalls,Pa. M12,R2 6.25
Buffalo B5 ..... 6.30
Camden,N.J. P13 ..... 6.70
Carnegie,Pa. C12 ..... 6.25
Chicago W18 ..... 6.25
Cleveland A7, C20 .... 6.25
Detroit B5, P17 ..... 6.45
Detroit R7 ..... 6.25
Donora,Pa. A7 ..... 6.25
Elyria,O. W8 ..... 6.25
FranklinPark, Ill. N5 .. 6.25
Gary,Ind. R2 ..... 6.25
GreenBay,Wis. F7 ..... 6.25
Hammond,Ind. L2, M13. 6.25
Hartford,Conn. R2 .... 6.75
Harvey,Ill. B5 ..... 6.25
LosAngeles(49) S30 .... 7.70
LosAngeles R2 ..... 7.70
Mansfield,Mass. B5 .... 6.80
Massillon,O. R2, R8 .... 6.25
Midland,Pa. C18 ..... 6.25
Monaca,Pa. S17 ..... 6.25
Newark,N.J. W18 ..... 6.70
NewCastle,Pa.(17) B4 .. 6.25
Pittsburgh J5 ..... 6.25
Plymouth,Mich. P5 .... 6.50
Putnam,Conn. W18 .... 6.80
Readville,Mass. C14 .... 6.80
S.Chicago,Ill. W14 .... 6.25
SpringCity,Pa. K3 .... 6.70
Struthers,O. Y1 ..... 6.25
Waukegan,Ill. A7 ..... 6.25
Worcester,Mass. W19 .... 6.70
Youngstown F3, Y1 .... 6.25

**BARS, Cold-Finished Carbon (Turned and Ground)**
Cumberland,Md.(5) C19 5.15

**BARS, Cold-Finished Alloy**
Ambridge,Pa. W18 ..... 7.425
BeaverFalls,Pa. M12,R2 7.425
Bethlehem,Pa. B2 ..... 7.425
Buffalo B5 ..... 7.425
Camden,N.J. P13 ..... 7.60
Canton,O. T7 ..... 7.425
Carnegie,Pa. C12 ..... 7.425
Chicago W18 ..... 7.425
Cleveland A7, C20 .... 7.425
Detroit R7 ..... 7.425
Detroit B5, P17 ..... 7.625
Donora,Pa. A7 ..... 7.425
Elyria,O. W8 ..... 7.425
Gary,Ind. R2 ..... 7.425
GreenBay,Wis. F7 ..... 7.425
Hammond,Ind. L2, M13. 7.425
Hartford,Conn. R2 .... 7.725
Harvey,Ill. B5 ..... 7.425
Lackawanna,N.Y. B2 .... 7.425
LosAngeles S30 ..... 9.10
Mansfield,Mass. B5 .... 7.725
Massillon,O. R2, R8 .... 7.425
Midland,Pa. C18 ..... 7.425
Monaca,Pa. S17 ..... 7.425
Newark,N.J. W18 ..... 7.60
Plymouth,Mich. P5 .... 7.625
S.Chicago W14 ..... 7.425
SpringCity,Pa. K3 .... 7.60
Struthers,O. Y1 ..... 7.425
Warren,O. C17 ..... 7.425
Waukegan,Ill. A7 ..... 7.425
Worcester,Mass. A7 .... 7.725
Youngstown F3, Y1 .... 7.425

**BARS, Reinforcing (To Fabricators)**
Ala.City,Ala. R2 ..... 4.65
Atlanta A11 ..... 5.15
Birmingham C15 ..... 5.15
Buffalo R2 ..... 4.65
Cleveland R2 ..... 4.65
Ecorse,Mich. G5 ..... 4.75
Emeryville,Calif. J7 .... 5.40
Fairfield,Ala. T2 ..... 4.65
Fairless,Pa. U5 ..... 4.80
Fontana,Calif. K1 ..... 5.35
Ft.Worth,Tex.(42) T4 .. 5.10
Gary,Ind. U5 ..... 4.65
Houston 85 ..... 4.90

Ind.Harbor,Ind. I-2, Y1..4.65
Johnstown,Pa. B2 .....4.65
Joliet,Ill. P22 .....5.15
KansasCity,Mo. S5 .....4.90
Lackawanna,N.Y. B2 ..4.65
LosAngeles B3 .....5.35
Milton,Pa. M18 .....4.80
Minnequa,Colo. C10 ....5.10
Niles,Calif. P1 .....5.35
Pittsburg,Calif. C11 ....5.35
Pittsburgh J5 .....4.65
Portland,Oreg. O4 .....5.40
SandSprings,Okla. S5 ..5.15
Seattle B3, N14 .....5.40
S.Chicago R2 .....4.65
S.Duquesne Pa. U5 .....4.65
S.SanFrancisco B3 .....5.40
SparrowsPoint,Md. B2 ..4.65
Sterling,Ill.(1) N15 ....4.65
Sterling,Ill. N15 .....4.75
Struthers,O. Y1 .....4.65
Torrance,Calif. C11 ....5.35
Youngstown R2, U5 ....4.65

### BARS, Reinforcing
(Fabricated; to Consumers)

Johnstown,Pa. ¼-1" B2..6.15
KansasCity,Kans. S5 ...6.45
Lackawanna,N.Y. B2 ..6.17
Marion,O. P11 .....6.15
Pittsburgh U8 .....6.17
Seattle B3, N14 .....6.60
SparrowsPt. ¼-1" B2 ..6.15
Williamsport,Pa. S19 ...6.00

### RAIL STEEL BARS

ChicagoHts.(3) C2, I-2..4.65
ChicagoHts.(4) C2, I-2..4.65
Ft.Worth,Tex.(26) T4 ..5.10
Franklin,Pa.(3) F5 ....4.65
Franklin,Pa.(4) F5 ....4.65
JerseyShore,Pa.(4) J8 ..4.65
Marion,O.(3) P11 .....4.65
Moline,Ill.(3) R2 .....4.80
Tonawanda(3) B12 ....5.15
Tonawanda(4) B12 ....5.15
Williamsport,Pa.(3) S19..4.65

### BARS, Wrought Iron

Economy,Pa.(S.R.)B14 11.50
Economy,Pa.(D.R.)B14 14.30
Economy(Staybolt)B14, 14.65
McK.Rks.(S.R.) L5 ...11.50
McK.Rks.(D.R.) L5 ...16.00
McK.Rks.(Staybolt) L5..17.00

## SHEETS

### SHEETS, Hot-Rolled Steel
(18 Gage and Heavier)

Ala.City,Ala. R2 .....4.325
Allenport,Pa. P7 .....4.325
Ashland,Ky.(8) A10 ..4.325
Cleveland J5, R2 .....4.325
Conshohocken,Pa. A3 ..4.375
Detroit(8) M1 .....4.425
Dravosburg,Pa. U5 ...4.325
Ecorse,Mich. G5 .....4.425
Fairfield,Ala. T2 .....4.325
Fairless,Pa. U5 .....4.375
Fontana,Calif. K1 ....5.125
Gary,Ind. U5 .....4.325
Geneva,Utah C11 .....4.425
GraniteCity,Ill. G4 ....4.525
Ind.Harbor,Ind. I-2,Y1..4.325
Lackawanna,N.Y. B2 ..4.325
Mansfield,O. E6 (37) ..4.325
Munhall,Pa. U5 .....4.325
Newport,Ky.(8) N9 ...4.325
Niles,O. M21 .....4.325
Pittsburg,Calif. C11 ..5.025
Pittsburgh J5 .....4.325
Portsmouth,O. P12 ....4.325
Riverdale,Ill. A1 .....4.55
Sharon,Pa. S3 .....4.325
S.Chicago,Ill. W14 ....4.325
SparrowsPoint,Md. B2..4.325
Steubenville,O. W10 ...4.325
Warren,O. R2 .....4.325
Weirton,W.Va. W6 ....4.325
Youngstown U5, Y1 ...4.325

### SHEETS, H.R., (19 Ga. & Lighter)

Ala.City,Ala. R2 .....5.625
Niles,O. M21 .....5.325

### SHEETS, H.R. Alloy

Dravosburg,Pa. U5 ....7.20
Gary,Ind. U5 .....7.20
Ind.Harbor,Ind. Y1 ....7.20
Youngstown Y1, U5 ....7.20

### SHEETS, H.R. (14 Ga. & Heavier)
High-Strength Low-Alloy

Cleveland J5, R2 .....6.375
Conshohocken,Pa. A3 ..6.425
Dravosburg,Pa. U5 ...6.375
Ecorse,Mich. G5 .....6.475
Fairfield,Ala. T2 .....6.375
Fairless,Pa. U5 .....6.425
Fontana,Calif. K1 ....7.175
Gary,Ind. U5 .....6.375
Ind.Harbor,Ind. I-2, Y1..6.375
Lackawanna(35) B2 ..6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
Sharon,Pa. S3 .....6.375
S.Chicago,Ill. U5 .....6.375
SparrowsPoint(36) B2..6.375
Warren,O. R2 .....6.375
Youngstown U5, Y1 ...6.375

### SHEETS, Hot-Rolled Ingot Iron
(18 Gage and Heavier)

Ashland,Ky.(8) A10 ...4.575
Ind.Harbor,Ind. I-2 ...4.575

### SHEETS, Cold-Rolled Steel
(Commercial Quality)

Allenport,Pa. P7 .....5.325
Cleveland J5, R2 .....5.325
Conshohocken,Pa. A3 ..5.375
Dravosburg,Pa. U5 ....5.325
Detroit M1 .....5.325
Ecorse,Mich. G5 .....5.425
Fairfield,Ala. T2 .....5.325
Fairless,Pa. U5 .....5.375
Follansbee,W.Va. F4 ..5.325
Fontana,Calif. K1 ....6.525
Gary,Ind. U5 .....5.325
GraniteCity,Ill. G4 ....5.525
Ind.Harbor,Ind. I-2, Y1..5.325
Lackawanna,N.Y. B2 ..5.325
Mansfield,O. E6 .....5.325
Middletown,O. A10 ....5.325
Newport, Ky. N9 .....5.325
Pittsburg,Calif. C11 ..6.275
Pittsburgh J5 .....5.325
Portsmouth O. P12 ....5.325
SparrowsPoint,Md. B2..5.325
Steubenville,O. W10 ...5.325
Warren,O. R2 .....5.325
Weirton,W.Va. W6 ....5.325
Youngstown Y1 .....5.325

### SHEETS, Cold-Rolled
High-Strength Low-Alloy

Cleveland J5, R2 .....7.875
Dravosburg,Pa. U5 ....7.875
Ecorse,Mich. G5 .....7.975
Fairless,Pa. U5 .....7.925
Fontana,Calif. K1 ....9.075
Gary,Ind. U5 .....7.875
IndianaHarbor,Ind. Y1..7.875
Lackawanna(37) B2 ..7.875
Pittsburgh J5 .....7.875
SparrowsPoint(38) B2..7.875
Warren,O. R2 .....7.875
Weirton,W.Va. W6 ....7.875
Youngstown Y1 .....7.875

### SHEETS, Cold-Rolled Ingot Iron

Middletown,O. A10 ....5.825

### SHEETS, Culvert

| (16 Gage) | Cu Alloy | Cu Fe |
|---|---|---|
| Ashland,Ky. A10 | 6.90 | ... |
| Canton,O. R2 | 6.10 | 6.55 |
| Dravosburg U5 | 6.10 | ... |
| Fairfield T2 | 6.10 | ... |
| Gary,Ind. U5 | 6.10 | 6.35 |
| Ind.Harbor I-2 | 6.10 | 6.35 |
| Kokomo,Ind. C16 | 6.20 | ... |
| MartinsFry. W10 | 6.10 | ... |
| Newport,Ky. N9 | 6.10 | 6.35 |
| Pitts.,Calif. C11 | 6.85 | ... |
| SparrowsPt. B2 | 6.10 | ... |

### SHEETS, Culvert—Pure Iron

Ashland,Ky. A10 .....7.15
Gary,Ind. U5 .....6.35
MartinsFry,O. W10 ....6.35

### SHEETS, Galvanized Steel
Hot-Dipped

Ala.City,Ala. R2 .....5.85‡
Ashland,Ky. A10 .....5.85†
Canton,O. R2 .....5.85‡
Dover,O. R1 .....5.85†
Dravosburg,Pa. U5 ....5.85†
Fairfield,Ala. T2 .....5.85†
Gary,Ind. U5 .....5.85*
GraniteCity,Ill. G4 ....6.05
Ind.Harbor,Ind. I-2 ...5.85†
Kokomo,Ind. C16 .....5.95‡
MartinsFerry,O. W10 ..5.85*
Middletown,O. A10 ....5.85†
Newport,Ky. N9 .....5.85‡
Pittsburg,Calif. C11 ..6.60*
Pittsburgh J5 .....5.85†
SparrowsPt.,Md. B2 ..5.85†
Warren,O. R2 .....5.85†
Weirton,W.Va. W6 ....5.85*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

### SHEETS, Well Casing

Fontana,Calif. K1 ....6.625

### SHEETS, Galvanized
High-Strength Low-Alloy

Dravosburg,Pa. U5 ....8.60
SparrowsPoint(39) B2 ..8.60

### SHEETS, Galvannealed Steel

Canton,O. R2 .....6.25
Dravosburg,Pa. U5 ....6.25
Kokomo,Ind. C16 .....6.60
Newport,Ky. N9 .....6.25

### SHEETS, Galvanized Ingot Iron
(Hot-dipped Continuous)

Ashland,Ky. A10 .....6.10
Middletown,O. A10 ....6.10

### SHEETS, Electrogalvanized

Cleveland(28) R2 .....6.70
Niles,O.(28) R2 .....6.70
Weirton,W.Va. W6 ....6.55

### SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 8.50
Butler,Pa. A10 (type 2) 8.60

### SHEETS, Enameling Iron

Ashland,Ky. A10 .....5.90
Cleveland R2 .....5.90
Dravosburg,Pa. U5 ....5.90
Gary,Ind. U5 .....5.90
GraniteCity,Ill. G4 ....6.10
Ind.Harbor,Ind. I-2 ....5.90
Middletown,O. A10 ....5.90
Niles,O. M21 .....5.90
Youngstown Y1 .....5.90

### BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ...7.75
Ind.Harbor,Ind. I-2 ....7.75
Yorkville,O. W10 .....7.75

### SHEETS, Long Terne Steel
(Commercial Quality)

BeechBottom,W.Va. W10 6.25
Gary,Ind. U5 .....6.25
Mansfield,O. E6 .....6.25
Middletown,O. A10 ....6.25
Niles,O. M21 .....6.25
Weirton,W.Va. W6 ....6.25

### SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....6.65

## Key To Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel Div., Sharon Steel Corp.
D4 Disston & Sons, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine&Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod., Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New Eng. High Carb. Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest.SteelRoll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 PacificStatesSteelCorp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburg Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 Reliance Div.,Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div. U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Div., H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet&Tube

## STRIP

**STRIP, Hot-Rolled Carbon**

Ala.City,Ala.(27) R2 ..4.325
Allenport,Pa. P7 .....4.325
Alton,Ill. L1 .....4.50
Ashland,Ky.(8) A10 ...4.325
Atlanta A11 .....4.525
Bessemer,Ala. T2 .....4.325
Birmingham C15 .....4.825
Bridgeport,Conn. N19 ..4.625
Buffalo(27) R2 .....4.325
Conshohocken,Pa. A3 ..4.375
Detroit M1 .....4.425
Ecorse,Mich. G5 .....4.425
Fairfield, Ala. T2 ....4.325
Fontana,Calif, K1 ....5.125
Gary,Ind. U5 .....4.325
Ind.Harbor,Ind. I-2,Y1.4.325
Johnstown,Pa.(25) B2..4.325
Lackaw'na,N.Y.(24) B2 4.325
LosAngeles (25) B3 ....5.075
Milton,Pa. M18 .....4.325
Minnequa,Colo, C10 ...5.425
Pittsburg,Calif. C11 ...5.075
Riverdale,Ill. A1 .....4.55
SanFrancisco 87 .....5.00
Seattle(25) B3 .....5.325
Seattle N14 .....5.40
Sharon,Pa. S3 .....4.325
S.Chicago,Ill W14 ....4.325
S.SanFrancisco(25) B3.5.075
SparrowsPoint,Md. B2..4.325
Sterling(1) N15 .....4.325
Sterling,Ill. N15 .....4.425
Torrance,Calif. C11 ...5.075
Warren,O. R2 .....4.325
Weirton,W.Va. W6 ....4.325
Youngstown U5 .....4.325

**High-Strength Low-Alloy**

Bridgeport,Conn. N19 ..7.50
Carnegie,Pa. S18 .....7.20
Fontana,Calif. K1 .....8.95
Gary,Ind. U5 .....7.20
Ind.Harbor,Ind. Y1 ....7.20
LosAngeles B3 .....8.40
Newport,Ky. N9 .....7.20
Sharon,Pa. S3 .....7.20
S.Chicago W14 .....7.20
Youngstown U5, Y1 ....7.20

**STRIP, Hot-Rolled High-Strength Low-Alloy**

Bessemer,Ala. T2 .....6.425
Conshohocken,Pa. A3 ..6.425
Ecorse,Mich. G5 .....6.525
Fairfield,Ala. T2 .....6.425
Fontana,Calif. K1 ....7.575
Gary,Ind. U5 .....6.425
Houston 85 .....6.675
Ind.Harbor,Ind. I-2,Y1.6.425
KansasCity,Mo. 86 ....6.675
Lackawanna,N.Y. B2 ..6.425
LosAngeles(25) B3 ....7.175
Seattle(25) B3 .....7.425
Sharon,Pa. S3 .....6.425
S.SanFrancisco(25) B3.7.175
SparrowsPoint,Md. B2..6.425
Warren,O. R2 .....6.425
Weirton,W.Va. W6 ....6.425
Youngstown U5, Y1 ....6.425

**STRIP, Hot-Rolled Ingot Iron**

Ashland,Ky.(8) A10 ...4.575

**STRIP, Cold-Rolled Carbon**

Anderson,Ind. G6 .....6.25
Baltimore T6 .....6.25
Boston T6 .....6.80
Buffalo 840 .....6.25
Cleveland A7, J5 .....6.25
Conshohocken,Pa. A3 ..6.30
Dearborn,Mich. D3 ....6.35
Detroit D2, M1, P20....6.35
Dover,O G6 .....6.25
Ecorse,Mich. G6 .....6.35
Follansbee,W.Va. F4 ...6.25
Fontana,Calif. K1 .....8.00
FranklinPark,Ill. T6 ...6.35
IndHarbor,Ind. I-2 ....6.35
Ind.Harbor,Ind. Y-1 ....6.25
Indianapolis C8 .....6.40
Lackawanna,N.Y. B2 ...6.25
LosAngeles C1 .....8.30
NewBedford,Mass. R10..6.70
NewBritain(10) S15 ...6.25
NewCastle,Pa. B4, E5 ..6.25
New Haven,Conn. A7 D2.6.70
NewKensington,Pa. A6..6.25
Pawtucket,R.I. R3 .....6.90
Pawtucket,R.I. N8 .....6.80
Pittsburgh J5 .....6.25
Riverdale,Ill. A1 .....6.35
Rome,N.Y. (32) R6 .....6.25
Sharon,Pa. S3 .....6.25
SparrowsPt.,Md. B2 ....6.25
Trenton,N.J.(31) R5 ...7.80
Wallingford,Conn. W2 ..6.70
Warren,O. R2 T5 .....6.25
Weirton,W.Va. W6 .....6.25
Worcester,Mass. A7 ....6.80
Youngstown C8, Y1 ....6.25

**STRIP, Cold-Rolled Alloy**

Boston T6 .....13.80
Carnegie,Pa. S18 .....13.45
Cleveland A7 .....13.45
Dover,O. G6 .....13.45
FranklinPark,Ill. T6 ..13.45
Harrison,N.J. C18 .....13.45
Indianapolis C8 .....13.60
Pawtucket,R.I. N8 ....13.80
Sharon,Pa. S3 .....13.45
Worcester,Mass. A7 ...13.75
Youngstown C8 .....13.45

**STRIP, Cold-Rolled High-Strength, Low-Alloy**

Cleveland A7 .....9.10
Dearborn,Mich. D3 ....9.20
Dover,O. G6 .....9.30
Ecorse,Mich. G5 .....9.20
Ind.Harbor,Ind. Y1 ....9.30

| STRIP, Cold-Finished Spring Steel (Annealed) | 0.26-0.40C | 0.41-0.60C | 0.61-0.80C | 0.81-1.05C | 1.06-1.35C |
|---|---|---|---|---|---|
| Baltimore T6 | 7.40 | 9.35 | 10.90 | 13.05 | 15.75 |
| Boston T6 | 7.65 | 9.35 | 10.90 | 13.05 | 15.75 |
| Bristol,Conn. W1 | ... | ... | 10.90 | 13.05 | 15.75 |
| Carnegie,Pa. S18 | ... | 9.05 | 10.60 | 12.75 | .... |
| Cleveland A7 | 7.10 | 9.05 | 10.60 | 12.75 | 15.45 |
| Cleveland C7 | ... | 9.05 | 10.60 | 12.75 | 15.45 |
| Dearborn,Mich. D3 | 7.20 | 9.15 | 10.70 | .... | .... |
| Detroit D2 | 7.20 | 9.15 | 10.70 | 12.85 | .... |
| Dover,O. G6 | 7.10 | 9.05 | 10.60 | 12.75 | 15.45 |
| FranklinPark,Ill. T6 | 7.20 | 9.05 | 10.60 | 12.75 | 15.45 |
| Harrison,N.J. C18 | ... | ... | 10.90 | 13.05 | 15.75 |
| Indianapolis C8 | 7.25 | 9.20 | 10.60 | 12.75 | 15.45 |
| NewBritain,Conn.(10) S15 | 7.10 | 9.05 | 10.60 | 12.75 | 15.45 |
| NewCastle,Pa. B4, E5 | 7.10 | 9.05 | 10.60 | 12.75 | .... |
| NewHaven,Conn. D2 | 7.55 | 9.35 | 10.90 | 13.05 | .... |
| NewKensington,Pa. A6 | 7.10 | 9.05 | 10.60 | .... | .... |
| NewYork W3 | ... | 9.35 | 10.90 | 13.05 | 15.75 |
| Pawtucket,R.I. N8 | 7.65 | 9.35 | 10.90 | 13.05 | 15.75 |
| Riverdale,Ill. A1 | 7.20 | 9.05 | 10.60 | 12.75 | 15.45 |
| Rome,N.Y.(32) R6 | 7.10 | 9.05 | 10.60 | 12.75 | 15.45 |
| Sharon,Pa. S3 | 7.10 | 9.05 | 10.60 | 12.75 | 15.45 |
| Trenton,N.J. R5 | ... | ... | 9.35 | 10.90 | 13.05 | 15.75 |
| Wallingford,Conn. W2 | 7.55 | 9.35 | 10.90 | 13.05 | 15.75 |
| Warren,O. T5 | 7.10 | 9.05 | 10.60 | 12.75 | 15.45 |
| Weirton,W.Va. W6 | 7.10 | 9.05 | 10.60 | 12.75 | 15.45 |
| Worcester,Mass. A7, T6 | 7.65 | 9.35 | 10.90 | 13.05 | 15.75 |
| Youngstown C8 | 7.10 | 9.05 | 10.60 | 12.75 | 15.45 |
| **Spring Steel (Tempered)** | | | | | |
| Bristol,Conn. W1 | ... | ... | 14.80 | 18.15 | .... |
| Buffalo W12 | ... | ... | 14.80 | .... | .... |
| FranklinPark,Ill. T6 | ... | ... | 15.15 | 18.50 | 22.35 |
| Harrison,N.J. C18 | ... | ... | 14.80 | 18.15 | 22.00 |
| NewYork W3 | ... | ... | 14.80 | 18.15 | 22.00 |
| Trenton,N.J. R5 | ... | ... | 14.80 | 18.15 | 22.00 |
| Worcester,Mass. W12 | ... | ... | 14.80 | .... | .... |
| Worcester,Mass. A7, T6 | ... | ... | 14.80 | 18.15 | 22.00 |
| Youngstown C8 | ... | ... | 15.15 | 18.50 | 22.35 |

**STRIP, Electrogalvanized**

Cleveland A7 .....6.25*
Dover,O. G6 .....6.25*
Riverdale,Ill. A1 .....6.35*
Warren,O. B9, T5 ....6.25*
Worcester,Mass. A7 ...6.80*
Youngstown C8 .....6.25*

*Plus galvanizing extras.

**STRIP, Galvanized (Continuous)**

Sharon, Pa. S3 .....6.55

**TIGHT COOPERAGE HOOP**

Atlanta A11 .....5.65
Riverdale,Ill. A1 .....4.90
Sharon,Pa. S3 .....4.75
Youngstown U5 .....4.75

## SILICON STEEL

| H.R. SHEETS (22 Ga., cut lengths) | Field | Armature | Electric | Motor | Dynamo |
|---|---|---|---|---|---|
| BeechBottom,W.Va. W10 .. | ... | ... | 9.95 | 10.95 | 11.85 |
| Brackenridge,Pa. A4 ..... | ... | ... | 9.95 | 10.95 | 11.85 |
| Mansfield,O. E6 | 8.40 | 9.35 | 9.95 | 10.95 | 11.85 |
| Newport,Ky. N9 | 8.40 | 9.35 | 9.95 | 10.95 | 11.85 |
| Niles,O. M21 | 8.40 | 9.35 | 9.95 | 10.95 | .... |
| Vandergrift,Pa. U5 ..... | ... | 9.35 | 9.95 | 10.95 | 11.85 |
| Warren,O. R2 | 8.40 | 9.35 | 9.95 | 10.95 | 11.85 |
| Zanesville,O. A10 ..... | ... | 9.35 | 9.95 | 10.95 | 11.85 |

**C.R. COILS & CUT LENGTHS, (22 Ga.)**

| Fully Processed (Semiprocessed ½c lower) | Field | Armature | Electric | Motor | Dynamo |
|---|---|---|---|---|---|
| Brackenridge,Pa. A4 ..... | ... | ... | 10.70 | 11.70 | 12.60 |
| GraniteCity,Ill. G4 ..... | 8.80* | 9.80* | 10.40* | 11.40* | .... |
| IndianaHarbor,Ind. I-2 .. | 8.60† | 9.60* | 10.20* | 11.20* | .... |
| Vandergrift,Pa. U5 ..... | 8.60* | 9.60* | 10.20* | 11.20* | 12.10* |
| Vandergrift,Pa. U5 ..... | ... | 10.10† | 10.70† | 11.70† | 12.60† |
| Warren,O. R2 ..... | 8.60† | 10.10 | 10.70 | 11.70 | 12.60 |

| | Transformer Grade | | | |
|---|---|---|---|---|
| H.R. SHEETS (22 Ga., cut lengths) | T-72 | T-65 | T-58 | T-52 |
| BeechBottom,W.Va. W10 .... | 12.80 | 13.35 | 13.85 | 14.85 |
| Brackenridge,Pa. A4 ..... | 12.80 | .... | .... | .... |
| Newport,Ky. N9 ..... | 12.80 | .... | .... | .... |
| Vandergrift,Pa. U5 ..... | 12.80 | 13.35 | 13.85 | 14.85 |
| Zanesville,O. A10 ..... | 12.80§ | 13.35§ | 13.85§ | 14.85§ |

| C.R. COILS & CUT LENGTHS (22 Ga.) | Grain Oriented T-100 | T-90 | T-80 | T-73 | T-66 | T-72 |
|---|---|---|---|---|---|---|
| Brackenridge,Pa. A4.. .... | 15.85 | 17.45 | 17.95 | 18.45 | 13.55** |
| Butler,Pa. A10 ..... | ... | 17.45 | 17.95 | .... | .... |
| Vandergrift,Pa. U5.. | 14.85 | 15.85 | 17.45 | 17.95 | .... | 13.55 |
| Warren,O. R2 ..... | ... | ... | ... | ... | ... | 13.55‡ |

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. §Coils, ¾-cent higher. **Cut lengths, ¾-cent lower.

## TIN MILL PRODUCTS

| TIN PLATE Electrolytic (Base Box) | 0.25 lb | 0.50 lb | 0.75 lb |
|---|---|---|---|
| Aliquippa,Pa. J5 ..... | $8.30 | $8.55 | $8.95 |
| Dravosburg,Pa. U5 ..... | 8.30 | 8.55 | 8.95 |
| Fairfield,Ala. T2 ..... | 8.40 | 8.65 | 9.05 |
| Fontana,Calif. K1 ..... | 9.05 | 9.30 | 9.70 |
| Fairiess,Pa. U5 ..... | 8.40 | 8.65 | 9.05 |
| Gary,Ind. U5 ..... | 8.30 | 8.55 | 8.95 |
| GraniteCity,Ill. G4 ..... | 8.40 | 8.65 | 9.05 |
| IndianaHarbor,Ind. I-2, Y1 ..... | 8.30 | 8.55 | 8.95 |
| Niles,O. R2 ..... | 8.30 | 8.55 | 8.95 |
| Pittsburg,Calif. C11 ..... | 9.05 | 9.30 | 9.70 |
| SparrowsPoint,Md. B2 ..... | 8.40 | 8.65 | 9.05 |
| Weirton,W.Va. W6 ..... | 8.30 | 8.55 | 8.95 |
| Yorkville,O. W10 ..... | 8.30 | 8.55 | 8.95 |

**ELECTROTIN (22-27 Gage; Dollars per 100 lb)**

| | | | |
|---|---|---|---|
| Aliquippa,Pa. J5 ..... | 6.975 | .... | .... |
| Niles,O. R2 ..... | 6.975 | 7.175 | 7.375 |

| TINPLATE, American | 1.25 lb | 1.50 lb |
|---|---|---|
| Aliquippa,Pa. J5 | $9.60 | $9.85 |
| Dravosburg,Pa. U5 | 9.60 | 9.85 |
| Fairfield,Ala. T2 | 9.70 | 9.95 |
| Fairiess,Pa. U5 | 9.70 | 9.95 |
| Fontana,Calif. K1 | 10.35 | 10.60 |
| Gary,Ind. U5 | 9.60 | 9.85 |
| Ind.Har. I-2, Y1 | 9.60 | 9.85 |
| Pitts.,Calif. C11 | 10.35 | 10.60 |
| Sp.Pt.,Md. B2 | 9.70 | 9.95 |
| Weirton,W.Va. W6 | 9.60 | 9.85 |
| Yorkville,O. W10 | 9.60 | 9.85 |

**BLACK PLATE (Base Box)**

| | |
|---|---|
| Aliquippa,Pa. J5 | $7.40 |
| Dravosburg,Pa. U5 | 7.40 |
| Fairfield,Ala. T2 | 7.50 |
| Fairiess,Pa. U5 | 7.50 |
| Fontana,Calif. K1 | 8.15 |
| Gary,Ind. U5 | 7.40 |
| GraniteCity,Ill. G4 | 7.50 |
| Ind.Harbor,Ind. I-2, Y1 | 7.40 |
| Niles,O. R2 | 7.40 |
| Pittsburg,Calif. C11 | 8.15 |
| SparrowsPoint,Md. B2 | 7.50 |
| Warren,O. R2 | 7.40 |
| Weirton,W.Va. W6 | 7.40 |
| Yorkville,O. W10 | 7.40 |

**HOLLOWARE ENAMELING Black Plate (29 Gage)**

| | |
|---|---|
| Dravosburg,Pa. U5 | 6.65 |
| Gary,Ind. U5 | 6.65 |
| GraniteCity,Ill. G4 | 6.75 |
| Ind.Harbor,Ind. Y1 | 6.65 |
| Yorkville,O. W10 | 6.65 |

**MANUFACTURING TERNES (Special Coated; Base Box)**

| | |
|---|---|
| Dravosburg,Pa. U5 | $9.10 |
| Gary,Ind. U5 | 9.10 |
| Yorkville,O. W10 | 9.10 |

**MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)**

| | |
|---|---|
| Yorkville,O. W10 | $9.55 |

**ROOFING SHORT TERNES (8 lb Coated; Base Box)**

| | |
|---|---|
| Gary,Ind. U5 | $10.65 |

## WIRE

**WIRE, Manufacturers Bright, Low Carbon**

AlabamaCity,Ala. R2 ..6.60
Aliquippa,Pa. J5 .....6.60
Alton,Ill. L1 .....6.775
Atlanta A11 .....6.80
Bartonville,Ill. K4 ....6.70
Buffalo W12 .....6.60
Chicago W13 .....6.60
Cleveland A7 .....6.60
Crawfordsville,Ind. M8..6.70
Donora,Pa. A7 .....6.60
Duluth,Minn. A7 .....6.60
Fairfield,Ala. T2 .....6.60
Fostoria,O.(24) S1 ....6.80
Houston 85 .....6.85
Jacksonville,Fla. M8 ..6.95
Johnstown,Pa. B2 .....6.60
Joliet,Ill. A7 .....6.60
KansasCity,Mo. 85 ....6.85
Kokomo,Ind. C16 .....6.70
LosAngeles B3 .....7.55
Minnequa,Colo. C10 ...6.85
Monessen,Pa. P7 .....6.60
Newark 6-8 ga. I-1 ....6.90
N.Tonawanda B11 .....6.60
Palmer,Mass. W12 .....6.90
Pittsburg,Calif. C11 ....7.55
Portsmouth,O. P12 .....6.60
Rankin,Pa. A7 .....6.60
S.Chicago,Ill. R2 .....6.60
S.SanFrancisco C10 ....7.55
SparrowsPoint,Md. B2 ..6.70
Sterling,Ill.(1) N15 ....6.60
Sterling,Ill. N15 .....6.70
Struthers,O. Y1 .....6.60
Waukegan,Ill. A7 .....6.60
Worcester,Mass. A7 ....6.90

**WIRE, MS Spring, High Carbon**

Aliquippa,Pa. J5 .....7.90
Alton,Ill. L1 .....8.075
Bartonville,Ill. K4 ....8.00
Buffalo W12 .....7.90
Cleveland A7 .....7.90
Donora,Pa. A7 .....7.90
Duluth,Minn. A7 .....7.90
Fostoria,O. S1 .....7.95
Johnstown,Pa. B2 .....7.90
LosAngeles B3 .....8.85
Milbury,Mass.(12) N6 ..8.20
Minnequa,Colo. C10 ...8.15
Monessen,Pa. P7, P16 ..7.90
Muncie,Ind. I-7 .....8.10
Palmer,Mass. W12 .....8.20
Pittsburg,Calif. C11 ....8.85
Portsmouth,O. P12 .....7.90
Roebling,N.J. R5 .....8.20
S.Chicago,Ill. R2 .....7.90
S.SanFrancisco C10 ....8.85
SparrowsPt., Md. B2 ....8.00
Struthers,O. Y1 .....7.90
Trenton,N.J. A7 .....8.20
Waukegan,Ill. A7 .....7.90
Worcester A7,J4,T6,W12 8.20

**WIRE, Upholstery Spring**

Aliquippa,Pa. J5 .....7.60
Alton,Ill. L1 .....7.775
Buffalo W12 .....7.60
Cleveland A7 .....7.60
Donora,Pa. A7 .....7.60
Duluth,Minn. A7 .....7.60
Johnstown,Pa. B2 .....7.60
KansasCity,Mo. 85 ....7.85
LosAngeles B3 .....8.55
Minnequa,Colo. C10 ...7.775
Monessen,Pa. P7, P16 ..7.60
NewHaven,Conn. A7 ....7.90
Palmer,Mass. W12 .....7.90
Pittsburg,Calif. C11 ....8.55
Portsmouth,O. P12 .....7.60
Roebling,N.J. R5 .....7.90
S.Chicago,Ill. R2 .....7.60
S.SanFrancisco C10 ....8.55
SparrowsPoint,Md. B2 ..7.70
Struthers,O. Y1 .....7.60
Trenton,N.J. A7 .....7.90
Waukegan,Ill. A7 .....7.60
Worcester,Mass. A7 ....7.90

**WIRE, Fine & Weaving (8" Coils)**

Alton,Ill. L1 .....12.725
Bartonville,Ill. K4 ....12.65
Buffalo W12 .....12.55
Chicago W13 .....12.55
Cleveland A7 .....12.55
Crawfordsville,Ind. M8.12.65
Fostoria,O. S1 .....12.55
Jacksonville,Fla. M8 ..12.90
Johnstown,Pa. B2 .....12.55
Kokomo,Ind. C16 .....12.55
Minnequa,Colo. C10 ...12.30
Monessen,Pa. P6 .....12.55
Muncie,Ind. I-7 .....12.75
Palmer,Mass. W12 .....12.85
Roebling,N.J. R5 .....12.85
S.SanFrancisco C10 ....12.90
Waukegan,Ill. A7 .....12.55
Worcester,Mass. A7,T6 12.85

**WIRE, Gal'd ACSR for Cores**

| | (A) |
|---|---|
| Bartonville,Ill. K4 | 10.70 |
| Buffalo W12 | 10.70 |
| Johnstown,Pa. B2 | 10.70 |
| Minnequa,Colo. C10 | 10.825 |
| Monessen,Pa. P16 | 10.70 |
| Muncie,Ind. I-7 | 10.90 |
| Palmer,Mass. W12 | 11.00 |
| Pittsburg,Calif. C11 | 11.50 |
| Portsmouth,O. P12 | 10.70 |
| Roebling,N.J. R5 | 11.00 |
| SparrowsPt.,Md. B2 | 10.80 |
| Struthers,O. Y1 | 10.70 |

**ROPE WIRE**

| | (A) |
|---|---|
| Bartonville,Ill. K4 | 10.55 |
| Buffalo W12 | 10.55 |
| Fostoria,O. S1 | 10.55 |
| Johnstown,Pa. B2 | 10.55 |
| Monessen,Pa. P7, P16 | 10.55 |
| Muncie,Ind. I-7 | 10.75 |
| Palmer,Mass. W12 | 10.85 |
| Portsmouth,O. P12 | 10.55 |
| Roebling,N.J. R5 | 10.85 |
| SparrowsPt. B2 | 10.65 |
| Struthers,O. Y1 | 10.55 |
| Worcester,Mass. J4 | 10.85 |

'A' Plow and Mild Plow; add 0.25c for Improved Plow.

## WIRE
(Continued)

**WIRE, Tire Bead**

| | |
|---|---|
| Bartonville Ill. K4 | 14.15 |
| Monessen,Pa. P16 | 14.20 |
| Roebling,N.J. R5 | 14.35 |

**WIRE, Cold-Rolled Flat**

| | |
|---|---|
| Anderson,Ind. G6 | 9.50 |
| Baltimore T6 | 9.80 |
| Boston T6 | 9.80 |
| Buffalo W12 | 9.50 |
| Cleveland A7 | 9.50 |
| Crawfordsville,Ind. M8 | 9.50 |
| Dover,O. G6 | 9.50 |
| Fostoria,O. S1 | 9.50 |
| FranklinPark,Ill. T6 | 9.60 |
| Kokomo,Ind. C16 | 9.50 |
| Massillon,O. R8 | 9.50 |
| Milwaukee C23 | 9.70 |
| Monessen,Pa. P7, P16 | 9.50 |
| Pawtucket,R.I. N8 | 9.80 |
| Riverdale,Ill. A1 | 9.60 |
| Rome,N.Y. R6 | 9.50 |
| Trenton,N.J. R5 | 9.80 |
| Worcester A7, T6, W12 | 9.80 |

**NAIL, Stock**

| To Dealers & Mfrs. (7) | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 152 |
| Aliquippa,Pa. J5 | 152 |
| Atlanta A11 | 154 |
| Bartonville,Ill. K4 | 154 |
| Chicago,Ill. W13 | 152 |
| Cleveland A9 | 157 |
| Crawfordsville Ind. M8 | 154 |
| Donora,Pa. A7 | 152 |
| Duluth,Minn. A7 | 152 |
| Fairfield,Ala. T2 | 152 |
| Galveston,Tex. D7 | 157 |
| Houston,Tex. S5 | 157 |
| Jack'ville,Fla.(20) M8 | 163 |
| Johnstown,Pa. B2 | 152 |
| Joliet,Ill. A7 | 152 |
| KansasCity,Mo. S5 | 157 |
| Kokomo,Ind. C16 | 154 |
| Minnequa,Colo. C10 | 157 |
| Monessen,Pa. P7 | 152 |
| Pittsburg,Calif. C11 | 171 |
| Rankin,Pa. A7 | 152 |
| S.Chicago,Ill. R2 | 152 |
| SparrowsPt.,Md. B2 | 154 |
| Sterling,Ill.(1) N15 | 152 |
| Worcester,Mass. A7 | 158 |

**NAILS, Cut (100 lb keg)**

| To Dealers (33) | |
|---|---|
| Conshohocken,Pa. A3 | $9.05 |
| Wheeling,W.Va. W10 | 9.05 |

**STAPLES, Polished Stock**

| To Dealers & Mfrs. (7) | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 152 |
| Aliquippa,Pa. J5 | 152 |
| Atlanta A11 | 154 |
| Bartonville,Ill. K4 | 154 |
| Crawfordsville,Ind. M8 | 154 |
| Donora,Pa. A7 | 152 |
| Duluth,Minn. A7 | 152 |
| Fairfield,Ala. T2 | 152 |
| Jack'ville,Fla.(20) M8 | 163 |
| Johnstown,Pa. B2 | 152 |
| Joliet,Ill. A7 | 152 |
| Kokomo,Ind. C16 | 154 |
| Minnequa,Colo. C10 | 157 |
| Monessen,Pa. P7 | 152 |
| Pittsburg,Calif. C11 | 171 |
| Rankin,Pa. A7 | 152 |
| S.Chicago,Ill. R2 | 152 |
| SparrowsPt.,Md. B2 | 154 |
| Sterling,Ill.(1) N15 | 152 |
| Worcester,Mass. A7 | 158 |

**TIE WIRE, Automat'c Baler (14½ Ga.)(Per 97 lb Net Box)**

| Coil No. 3150 | |
|---|---|
| AlabamaCity,Ala. R2 | $9.45 |
| Bartonville,Ill. K4 | 9.45 |
| Buffalo W12 | 9.45 |
| Crawfordsville,Ind. M8 | 9.55 |
| Donora,Pa. A7 | 9.45 |
| Duluth,Minn. A7 | 9.45 |
| Jacksonville Fla. M8 | 10.01 |
| Johnstown,Pa. B2 | 9.45 |
| Joliet,Ill. A7 | 9.45 |
| Kokomo,Ind. C16 | 9.55 |
| LosAngeles B3 | 10.24 |
| Minnequa,Colo. C10 | 9.65 |
| Pittsburg,Calif. C11 | 10.23 |
| S.Chicago,Ill. R2 | 9.45 |
| SparrowsPt.,Md. B2 | 9.55 |
| Sterling,Ill. N15 | 9.35 |

**Coil No. 6500 Staind.**

| | |
|---|---|
| AlabamaCity,Ala. R2 | $9.75 |
| Bartonville,Ill. K4 | 9.75 |
| Buffalo W12 | 9.75 |
| Crawfordsville,Ind. M8 | 9.85 |
| Donora,Pa. A7 | 9.75 |
| Duluth,Minn. A7 | 9.75 |
| Jacksonville,Fla. M8 | 10.31 |
| Johnstown,Pa. B2 | 9.75 |
| Joliet,Ill. A7 | 9.75 |
| Kokomo,Ind. C16 | 9.85 |
| LosAngeles B3 | 10.55 |
| Minnequa,Colo. C10 | 9.90 |
| Pittsburg,Calif. C11 | 10.55 |
| S.Chicago,Ill. R2 | 9.75 |
| SparrowsPt.,Md. B2 | 9.85 |
| Sterling,Ill. N15 | 9.65 |

**Coil No. 6500 Interim**

| | |
|---|---|
| AlabamaCity,Ala. R2 | $9.80 |
| Bartonville,Ill. K4 | 9.80 |
| Buffalo W12 | 9.80 |
| Crawfordsville,Ind. M8 | 9.90 |
| Donora,Pa. A7 | 9.80 |
| Duluth,Minn. A7 | 9.80 |
| Jacksonville,Fla. M8 | 10.36 |
| Johnstown,Pa. B2 | 9.80 |
| Joliet,Ill. A7 | 9.80 |
| Kokomo,Ind. C16 | 9.90 |
| LosAngeles B3 | 10.60 |
| Minnequa,Colo. C10 | 9.95 |
| Pittsburg,Calif. C11 | 10.60 |
| S.Chicago,Ill. R2 | 9.80 |
| SparrowsPt.,Md. B2 | 9.90 |
| Sterling,Ill. N15 | 9.70 |

**WIRE, Barbed**

| | Col. |
|---|---|
| AlabamaCity,Ala. R2 | 175** |
| Aliquippa,Pa. J5 | 172† |
| Atlanta A11 | 181 |
| Bartonville,Ill. K4 | 181 |
| Crawfordsville,Ind. M8 | 181 |
| Donora,Pa. A7 | 175† |
| Duluth,Minn. A7 | 175† |
| Fairfield,Ala. T2 | 175† |
| Houston,Tex. S5 | 180** |
| Jacksonville,Fla. M8 | 186 |
| Johnstown,Pa. B2 | 179* |
| Joliet,Ill. A7 | 175† |
| KansasCity,Mo. S5 | 180** |
| Kokomo,Ind. C16 | 177† |
| Minnequa,Colo. C10 | 180** |
| Monessen,Pa. P7 | 178†† |
| Pittsburg,Calif. C11 | 195† |
| Rankin,Pa. A7 | 175† |
| S.Chicago,Ill. R2 | 175** |
| S.SanFrancisco C10 | 195** |
| SparrowsPoint,Md. B2 | 181* |
| Sterling,Ill.(1) N15 | 179†† |

**WOVEN FENCE, 9-15 Ga.**

| | Col. |
|---|---|
| Ala.City,Ala. R2 | 162** |
| Aliq'ppa,Pa.9-14½ga J5 | 165‡ |
| Atlanta A11 | 168 |
| Bartonville,Ill. K4 | 168 |
| Crawfordsville,Ind. M8 | 168 |
| Donora,Pa. A7 | 162† |
| Duluth,Minn. A7 | 162† |
| Fairfield,Ala. T2 | 162† |
| Houston,Tex. S5 | 167** |
| Jacksonville,Fla. M8 | 173 |
| Johnstown,Pa.(43) B2 | 166 |
| Joliet,Ill. A7 | 162† |
| KansasCity,Mo. S5 | 167** |
| Kokomo,Ind. C16 | 164† |
| Minnequa,Colo. C10 | 167** |
| Monessen,Pa. 9 gs. P7 | 166†† |
| Pittsburg,Calif. C11 | 185† |
| Rankin,Pa. A7 | 162† |
| S.Chicago,Ill. R2 | 162** |
| Sterling,Ill.(1) N15 | 166†† |

**WIRE (16 Gage)**

| | An'ld Stone | Galv. Stone |
|---|---|---|
| Ala.City R2 | 14.50 | 16.05** |
| Bartonville K4 | 14.50 | 16.55 |
| Buffalo W12 | 14.50 | |
| Cleveland A7 | 14.50 | |
| Crawf'dsville M8 | 14.60 | 16.55 |
| Fostoria,O. S1 | 14.60 | 16.15† |
| Jacksonville M8 | 14.85 | 16.80 |
| Johnstown B2 | 14.50 | 16.40* |
| Kokomo C16 | 14.60 | 16.15† |
| Minnequa C10 | 14.75 | 16.45** |
| Palmer,MassW12 | 14.50 | 16.05* |
| Pitts.,Calif. C11 | 14.85 | 16.40† |
| S.Chicago R2 | 14.50 | 16.05** |
| SparrowsPt. B2 | 14.60 | 16.50* |
| Sterling(1) N15 | 14.50 | 16.45†† |
| Waukegan A7 | 14.50 | 16.05 |
| Worcester A7 | 14.80 | |

**WIRE, Merchant Quality**

| (6 to 8 gauge) | An'ld | Galv. |
|---|---|---|
| Ala.City,Ala. R2 | 7.50 | 7.90** |
| Aliquippa J5 | 7.40 | 7.925‡ |
| Atlanta A11 | 7.60 | 8.20 |
| Bartonville(48) K4 | 7.60 | 8.20 |
| Buffalo W12 | 7.50 | 7.90† |
| Cleveland A7 | 7.50 | |
| Crawfordsville M8 | 7.60 | 8.20 |
| Donora,Pa. A7 | 7.50 | 7.90† |
| Duluth,Minn. A7 | 7.50 | 7.90† |
| Fairfield T2 | 7.50 | 7.90† |
| Houston(48) S5 | 7.65 | 8.05** |
| Jacks'ville,Fla. M8 | 7.85 | 8.45 |
| Johnstown B2(48) | 7.50 | 8.10* |
| Joliet,Ill. A7 | 7.50 | 7.90† |
| Kans.City(48) S5 | 7.65 | 8.05** |
| Kokomo C16 | 7.60 | 8.00† |
| LosAngeles B3 | 8.45 | 9.05* |
| Minnequa C10 | 7.65 | 8.05** |
| Monessen P7(48) | 7.40 | 8.00†† |
| Palmer,Mass. W12 | 7.50 | 8.20† |
| Pitts.,Calif. C11 | 8.45 | 8.85† |
| Portsmouth,O. P12 | 7.50 | |
| Rankin A7 | 7.50 | 7.90† |
| S.Chicago R2 | 7.50 | 7.90** |
| S.SanFran. C10 | 8.35 | 8.75** |
| Spar'wsPt. B2(48) | 7.60 | 8.20* |
| Str'ling(1)(48) | N15 7.40 | 8.00†† |
| Struth'rs,O.(48) | Y1 7.50 | 8.00‡ |
| Worcester,Mass. | A7 7.80 | 8.20† |

Based on zinc price of: S.Chicago,Ill. R2, 9.75 cents. *13.50c. †5c. ‡10c. ††Less than 10c. †††3c. **Subject to zinc equalization extras.

## FASTENERS

**(Base discounts, full case quantity, per cent off list to consumer, f.o.b. mill)**

**Carriage, Machine Bolts**

| | |
|---|---|
| **Full-Size Body (cut thread)** | |
| †1½" x 6" and smaller | 61 |
| **Larger than ½" diam. and all diams. longer than 6"** | 58 |
| **Under-Size Body (rolled thread; not nutted):** | |
| ⅛" x 6" and smaller | 61 |

†1½" x 4" and smaller and shorter are not nutted.

**NUTS**

| | |
|---|---|
| **Reg. & Heavy Square Nuts:** | |
| All sizes | 61 |
| **H.P. Reg. & Heavy Hex Nuts:** | |
| ¾" & smaller | 64 |
| ⅞" to 1½" incl. | 62 |
| 1¼" to 1½" incl. | 60 |
| 1⅝" & larger | 61 |
| **C.P. Reg. & Heavy Hex Nuts** | |
| ¾" & smaller | 64 |
| ⅞" & larger | 61 |
| **Semifinished & Finished Nuts** | |
| ¾" & smaller | 66 |
| ⅞" & larger | 63 |
| **Semifinished Slotted Reg. & Heavy Hex Nuts** | |
| ¾" & smaller | 66 |
| ⅞" & larger | 63 |
| **Hot Galvanized Nuts, all types** | |
| 1⅛" & smaller | 44 |

(On above items, add 25% for less than case quantities)

**CAP SCREWS**
(New Std., hexagon head, upset, packages)

| | |
|---|---|
| **Bright:** | |
| 6" and shorter: | |
| ¼" through ½" diam. | 34 |
| ⅝" & ¾" diam. | 31 |
| ⅞", 1⅛", 1" | 8 |
| Longer than 6": | |
| ¼" through ⅝" diam. | 3 |
| ⅞" through 1" diam. | + 13 |
| **High Carbon, Heat-treated:** | |
| 6" and shorter: | |
| ¼" through ½" diam. | 20 |
| ⅝" & ¾" diam. | 16 |
| ⅞", 1⅛", 1" | + 11 |
| Longer than 6": | |
| ¼" through ⅝" diam. | + 23 |
| ⅞" through 1" diam. | + 41 |

**(New Std. Hexagon head, upset, bulk)**

| | |
|---|---|
| **Bright:** | |
| ¼" x 6" & smaller & shorter | 49 |
| ⅝", ½", ⅝" diam. x 6" & shorter | 48 |
| ⅞", 1⅛", 1" x 6" & shorter | 31 |
| **High Carbon, Heat-treatrd:** | |
| ¼" x 6" & smaller & shorter | 41 |
| ⅝" x ⅞" diam. & 6" & shorter | 39 |
| ⅞", 1⅛", 1" x 6" & shorter | 20 |

**MACHINE SCREW NUTS & STOVE BOLT NUTS (Bulk)**

| | |
|---|---|
| No. 2 to ⅜" incl., Square: | |
| 25,000 to 199,999 pieces | 20 |
| 200,000 or more pieces | 27 |
| No. 2 to ⅜" incl., Hex.: | |
| 25,000 to 199,999 pieces | 18 |
| 200,000 or more pieces | 25 |

**MACHINE SCREWS, SLOTTED (Bulk)**

| | |
|---|---|
| No. 2 to ¼" diam. incl.: | |
| 25,000 to 199,999 pieces | 20 |
| 200,000 or more pieces | 27 |
| ⅝" to ¾" diam. incl.: | |
| 15,000 to 99,999 pieces | 20 |
| 100,000 or more | 27 |

## BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

| O.D. In. | B.W. Gage | Seamless H.R. | Seamless C.D. | Elec. Weld H.R. |
|---|---|---|---|---|
| 1 | 13 | | 21.55 | 20.90 |
| 1¼ | 13 | | 25.53 | 21.25 |
| 1½ | 13 | 24.24 | 28.22 | 23.50 |
| 1¾ | 13 | 28.63 | 33.34 | 27.76 |
| 2 | 13 | 32.09 | 37.37 | 31.13 |
| 2¼ | 13 | 36.14 | 42.09 | 35.05 |
| 2½ | 12 | 39.23 | 45.67 | 38.05 |
| 2¾ | 12 | 43.22 | 50.31 | 41.91 |
| 2¾ | 12 | 46.79 | 54.48 | 45.38 |
| 3 | 12 | 49.90 | 58.10 | 48.39 |

## RAILWAY MATERIALS

| | Standard No. 1 | Standard No. 2 | Standard All No. 2 | Tee Rails 60 lb Under |
|---|---|---|---|---|
| **RAILS** | | | | |
| Bessemer,Pa. U5 | 4.725 | 4.625 | 4.675 | 5.65 |
| Ensley,Ala. T2 | 4.725 | 4.625 | | 5.65 |
| Fairfield,Ala. T2 | | | | 5.65 |
| Gary,Ind. U5 | 4.725 | 4.625 | 4.675 | |
| Huntington,W.Va. W7 | | | | 5.65 |
| IndianaHarbor,Ind. I-2 | 4.725 | 4.625 | 4.675 | |
| Johnstown,Pa. B2 | | | | (16)5.65 |
| Lackawanna,N.Y. B2 | 4.725 | 4.625 | | (16)5.65 |
| Minnequa,Colo. C10 | 4.725 | 4.625 | | 6.15 |
| Steelton,Pa. B2 | 4.725 | 4.625 | | |
| Williamsport,Pa. S19 | | | | 5.65 |

**TIE PLATES**

| | |
|---|---|
| Fairfield,Ala. T2 | 5.625 |
| Gary,Ind. U5 | 5.625 |
| Ind.Harbor,Ind. I-2 | 5.625 |
| Lackawanna,N.Y. B2 | 5.625 |
| Minnequa,Colo. C10 | 5.625 |
| Seattle B3 | 5.775 |
| Steelton,Pa. B2 | 5.625 |
| Torrance,Calif. C11 | 5.775 |

**TRACK BOLTS, Untreated**

| | |
|---|---|
| Cleveland R2 | 12.15 |
| KansasCity,Mo. S5 | 12.90* |
| Lebanon,Pa. B2 | 12.15 |
| Minnequa,Colo. C10 | 12.15 |
| Pittsburgh O3, P14 | 12.15 |
| Seattle B3 | 12.65 |

*Treated

**AXLES**

| | |
|---|---|
| Ind.Harbor,Ind. S13 | 7.50 |
| Johnstown,Pa. B2 | 7.50 |

**JOINT BARS**

| | |
|---|---|
| Bessemer,Pa. U5 | 5.825 |
| Fairfield,Ala. T2 | 5.825 |
| Ind.Harbor Ind. I-2 | 5.825 |
| Joliet,Ill. U5 | 5.825 |
| Lackawanna,N.Y. B2 | 5.825 |
| Minnequa,Colo. C10 | 5.825 |
| Steelton,Pa. B2 | 5.825 |

**SCREW SPIKES**

| | |
|---|---|
| Cleveland R2 | 11.90 |
| Pittsburgh O3 | 11.90 |

**STANDARD TRACK SPIKES**

| | |
|---|---|
| Fairfield,Ala. T2 | 8.05 |
| Ind.Harbor,Ind. Y1 | 8.05 |
| Ind.Harbor,Ind. I-2 | 7.90 |
| KansasCity,Mo. S5 | 7.90 |
| Lebanon,Pa. B2 | 8.05 |
| Minnequa,Colo. C10 | 7.90 |
| Pittsburgh J5 | 8.05 |
| Seattle B3 | 8.55 |
| S.Chicago,Ill. R2 | 8.05 |
| Struthers,O. Y1 | 8.05 |
| Youngstown R2 | 8.05 |

## METAL POWDER

| | |
|---|---|
| **(Per pound f.o.b. shipping po'nt in ton lots for minus 100 mesh, except as noted:** | |
| Sponge iron: | Cents |
| *98 + % Fe, annealed* | *8.50* |
| Swedish, c.i.f., Camden, N.J., c.l. in bags | 9.50 |
| Domestic: | |
| F.o.b. Johnstown, Pa., Niagara Falls, N. Y., in bags | 9.50 |
| F.o.b. Riverton, N. J., in bags | 8.50 |
| Canadian, f.o.b. shipping point | 9.50 |
| Electrolytic iron: | |
| Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in. | 22.00 |
| Annealed, 99.5% Fe | 36.50 |
| Unannealed (99 + % Fe) | 34.00 |
| Unannealed (99 + % Fe) (minus 325 mesh) | 57.00 |
| Powder Flakes (minus 16, plus 100 mesh) | 31.00 |
| Carbonyl Iron: | |
| 98.1-99.9%, 3 to 20 microns, depending on grade, 86.00-275.00, in standard 200-lb containers; all minus 200 mesh. | |
| Aluminum: | |
| Atomized, 500 lb, drum frght. allowed | |
| Carlots | 34.50 |
| Ton lots | 36.50 |
| Antimony, 500 lb lots | 32.00* |
| Brass, 5000-lb lots | 41.75-65.25† |
| Bronze, 5000-lb lots | 67.50-71.75† |
| Copper: | |
| Electrolytic | 14.25* |
| Reduced | 14.25* |
| Lead | 7.50* |
| Manganese: | |
| Minus 35 mesh | 64.00 |
| Minus 100 mesh | 70.00 |
| Minus 200 mesh | 75.00 |
| Nickel, unannealed | $1.00 |
| Nickel-Silver, 5000-lb lots | 62.75-65.25† |
| Phosphor-Copper, 5000-lb lots | 68.75 |
| Silicon | 47.50 |
| Solder | 7.00* |
| Stainless Steel, 302 | 99.00 |
| Stainless Steel, 316 | $1.32 |
| Tin | 14.50* |
| Zinc 5000-lb lots | 19.25-33.00‡ |
| Tungsten | Dollars |
| Melting grade, 99% 60 to 200 mesh: | |
| 1000 lb and over | 4.50 |
| Less than 1000 lb | 4.65 |
| Chromium, electrolytic 99.8% Cr min. metallic basis | 5.00 |

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 29% Zn, 1% Ni. **64% Cu, 18% Zn, 18% Ni.

## Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1¼-in. to less than 1 7/16-in.
(6) Chicago or Birm. base.
(7) To jobbers, 2 cnts lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass. base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.85c.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.25c.
(27) Bar mill sizes.
(28) Bondevized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 6.95c for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 12" and narrower.
(36) 54" and narrower.
(37) 13 Ga. & heavier; 60" & narrower.
(38) 14 Ga. & Lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.25c.
(43) 9.14½ Ga.
(48) 6.7 Ga.
(49) 3½ in. and smaller rounds; 7.95c over 3½ in. and other shapes.

## SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

| Size—Inches | 2 | | 2½ | | 3 | | 3½ | | 4 | | 5 | | 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| List Per Ft | 37c | | 58.5c | | 76.5c | | 92c | | $1.09 | | $1.48 | | $1.92 | |
| Pounds Per Ft | 3.68 | | 5.82 | | 7.62 | | 9.20 | | 10.89 | | 14.81 | | 19.18 | |
| | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* |
| Aliquippa, Pa. J5 | 4 | +14 | 10.5 | +8.25 | 13 | +5.75 | 14.5 | +4.25 | 14.5 | +4.25 | 14 | +4.75 | 16.5 | +2.25 |
| Ambridge, Pa. N2 | 4 | .... | 10.5 | .... | 13 | .... | 14.5 | .... | 14.5 | .... | 14 | .... | 16.5 | .... |
| Lorain, O. N3 | 4 | +14 | 10.5 | +8.25 | 13 | +5.75 | 14.5 | +4.25 | 14.5 | +4.25 | 14 | +4.75 | 16.5 | +2.25 |
| Youngstown Y1 | 6.5 | +11.5 | 10.5 | +8.25 | 13 | +5.75 | 14.5 | +4.25 | 14.5 | +4.25 | 14 | +4.75 | 16.5 | +2.25 |

## ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Youngstown R2 | 6.5 | +11.5 | 10.5 | +8.25 | 13 | +5.75 | 14.5 | +4.25 | 14.5 | +4.25 | 14 | +4.75 | 16.5 | +2.25 |

## BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

| Size—Inches | ⅛ | | ¼ | | ⅜ | | ½ | | ¾ | | 1 | | 1¼ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| List Per Ft | 5.5c | | 6c | | 6c | | 8.5c | | 11.5c | | 17c | | 23c | |
| Pounds Per Ft | 0.24 | | 0.42 | | 0.57 | | 0.85 | | 1.13 | | 1.68 | | 2.28 | |
| | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* |
| Aliquippa, Pa. J5 | .... | .... | .... | .... | .... | .... | 18.5 | +0.75 | 21.5 | 3.25 | 24 | 6.75 | 26.5 | 8.5 |
| Alton, Ill. L1 | .... | .... | .... | .... | .... | .... | 16.5 | +2.75 | 19.5 | 1.25 | 22 | 4.75 | 24.5 | 6.5 |
| Benwood, W. Va. W10 | 17.5 | +13 | 9 | +18.5 | +0.75 | +28.5 | 18.5 | +0.75 | 21.5 | 3.25 | 24 | 6.75 | 26.5 | 8.5 |
| Butler, Pa. P6 | 18 | +12.5 | 9.5 | +18 | 1.5 | +26 | .... | .... | .... | .... | .... | .... | .... | .... |
| Etna, Pa. N2 | .... | .... | .... | .... | .... | .... | 18.5 | +0.75 | 21.5 | 3.25 | 24 | 6.75 | 26.5 | 8.5 |
| Fairless, Pa. N3 | .... | .... | .... | .... | .... | .... | 16.5 | +2.75 | 19.5 | 1.25 | 22 | 4.75 | 24.5 | 6.5 |
| Fontana, Calif. K1 | .... | .... | .... | .... | .... | .... | 6 | +13.25 | 9 | +9.25 | 11.5 | +5.75 | 14 | +4 |
| Ind. Harbor, Ind. Y1 | .... | .... | .... | .... | .... | .... | 17.5 | +1.75 | 20.5 | 2.25 | 23 | 5.75 | 25.5 | 7.5 |
| Lorain, O. N3 | .... | .... | .... | .... | .... | .... | 18.5 | +0.75 | 21.5 | 3.25 | 24 | 6.75 | 26.5 | 8.5 |
| Sharon, Pa. S4 | 18 | +12.5 | 9.5 | +18 | 1.5 | +26 | .... | .... | .... | .... | .... | .... | .... | .... |
| Sharon, Pa. M6 | .... | .... | .... | .... | .... | .... | 18.5 | +0.75 | 21.5 | 3.25 | 24 | 6.75 | 26.5 | 8.5 |
| Sparrows Pt., Md. B2 | 16 | +12.5 | 7.5 | +18 | +0.5 | +26 | 16.5 | +0.75 | 19.5 | 3.25 | 22 | 6.75 | 24.5 | 8 |
| Youngstown R2, Y1 | .... | .... | .... | .... | .... | .... | 18.5 | +0.75 | 21.5 | 3.25 | 24 | 6.75 | 26.5 | 8.5 |
| Wheatland, Pa. W9 | 18 | +12.5 | 9.5 | +18 | 1.5 | +26 | 18.5 | +0.75 | 21.5 | 3.25 | 24 | 6.75 | 26.5 | 8.5 |

| Size—Inches | 1½ | | 2 | | 2½ | | 3 | | 3½ | | 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| List Per Ft | 27.5c | | 37c | | 58.5c | | 76.5c | | 92c | | $1.09 | |
| Pounds Per Ft | 2.73 | | 3.68 | | 5.82 | | 7.62 | | 9.20 | | 10.89 | |
| | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* | Blk | Galv* |
| Aliquippa, Pa. J5 | 27 | 9.5 | 27.5 | 10 | 29 | 10.75 | 29 | 10.75 | .... | .... | .... | .... |
| Alton, Ill. L1 | 25 | 7.5 | 25.5 | 8 | 27 | 8.75 | 27 | 8.75 | .... | .... | .... | .... |
| Benwood, W. Va. W10 | 27 | 9.5 | 27.5 | 10 | 29 | 10.75 | 29 | 10.75 | 19.5 | 0.75 | 19.5 | 0.75 |
| Etna, Pa. N2 | 27 | 9.5 | 27.5 | 10 | 29 | 10.75 | 29 | 10.75 | 19.5 | 0.75 | 19.5 | 0.75 |
| Fairless, Pa. N3 | 25 | 7.5 | 25.5 | 8 | 27 | 8.75 | 27 | 8.75 | 17.5 | +1.25 | 17.5 | +1.25 |
| Fontana, Calif. K1 | 14.5 | +3 | 15 | +2.5 | 16.5 | +1.75 | 16.5 | +1.75 | 7 | +11.75 | 7 | +11.75 |
| Ind. Harbor, Ind. Y1 | 26 | 8.5 | 26.5 | 9 | 28 | 9.75 | 28 | 9.75 | 18.5 | +0.25 | 18.5 | +0.25 |
| Lorain, O. N3 | 27 | 9.5 | 27.5 | 10 | 29 | 10.75 | 29 | 10.75 | .... | .... | .... | .... |
| Sharon, Pa. M6 | 27 | 9.5 | 27.5 | 10 | 29 | 10.75 | 29 | 10.75 | .... | .... | .... | .... |
| Sparrows Pt., Md. B2 | 25 | 9 | 25.5 | 9.5 | 27 | 9.75 | 27 | 9.75 | 17.5 | +0.25 | 17.5 | +0.25 |
| Wheatland, Pa. W9 | 27 | 9.5 | 27.5 | 10 | 29 | 10.75 | 29 | 10.75 | 19.5 | 0.75 | 19.5 | 0.75 |
| Youngstown R2, Y1 | 27 | 9.5 | 27.5 | 10 | 29 | 10.75 | 29 | 10.75 | 19.5 | 0.75 | 19.5 | 0.75 |

*Galvanized pipe discounts based on current price of zinc (13.50c, East St. Louis).

# Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

| AISI Type | —Rerolling— Ingot | Slabs | Forging Billets | Seamless Tube Billets | H.R. Strip | Wire Rods; C.F. Wire | Bars; Structural Shapes | Plates | Sheets | C.R. Strip; Flat Wire |
|---|---|---|---|---|---|---|---|---|---|---|
| 201 | 18.50 | 23.00 | .... | .... | 31.00 | .... | .... | .... | 42.25 | 39.00 |
| 202 | 19.75 | 25.50 | 31.00 | 36.25 | 33.50 | .... | 26.75 | 38.75 | 42.50 | 42.50 |
| 301 | 19.25 | 23.75 | .... | 36.75 | 32.00 | 36.00 | 28.00 | .... | 44.25 | 41.00 |
| 302 | 20.50 | 26.25 | 32.00 | 37.25 | 34.50 | 36.25 | 28.25 | 40.25 | 44.50 | 44.50 |
| 302B | 20.25 | 26.50 | 33.00 | 37.25 | 37.75 | 36.25 | 28.25 | 40.25 | 47.00 | 47.00 |
| 303 | .... | 26.75 | 34.75 | 48.00 | .... | 39.00 | 41.00 | .... | .... | .... |
| 304 | 21.75 | 27.50 | 33.75 | 39.00 | 37.25 | 38.25 | 40.25 | 43.00 | 47.25 | 47.25 |
| 304L | .... | .... | 40.25 | .... | 43.75 | 45.25 | 47.25 | 50.00 | 54.25 | 54.25 |
| 305 | 23.25 | 30.50 | .... | 39.50 | 40.25 | 38.25 | 40.25 | 43.50 | 50.25 | 50.25 |
| 308 | 25.00 | 32.00 | 40.00 | .... | 42.75 | 45.25 | 47.50 | 51.75 | 54.00 | 54.00 |
| 309 | 32.50 | 41.25 | 48.25 | .... | 55.00 | 54.00 | 56.75 | 60.25 | 69.00 | 69.00 |
| 310 | 39.75 | 50.50 | 64.75 | .... | 71.00 | 72.25 | 76.50 | 78.25 | 81.75 | 81.75 |
| 314 | .... | .... | .... | .... | .... | 72.75 | .... | 78.25 | .... | .... |
| 316 | 33.00 | 41.75 | 52.75 | .... | 59.75 | 59.75 | 62.75 | 66.00 | 70.25 | 70.25 |
| 316L | .... | .... | 58.75 | .... | 65.75 | 65.75 | 69.75 | 73.00 | 77.25 | 77.25 |
| 317 | 40.25 | 51.25 | 65.75 | .... | 76.50 | 74.75 | 78.50 | 81.00 | 87.75 | 87.75 |
| 321 | 26.50 | 33.50 | 39.75 | .... | 45.75 | 45.00 | 47.25 | 51.25 | 56.25 | 56.25 |
| 18-8CbTa | 30.75 | 39.50 | 47.25 | .... | 54.75 | 52.75 | 55.50 | 60.00 | 65.50 | 65.50 |
| 403 | .... | .... | 28.75 | 32.75 | .... | 32.25 | 34.00 | 36.25 | .... | .... |
| 405 | 17.50 | 23.00 | 26.75 | 31.00 | 32.25 | 30.50 | 32.00 | 33.75 | 42.25 | 42.25 |
| 410 | 15.00 | 19.50 | 25.50 | 29.50 | 28.00 | 29.00 | 30.50 | 31.75 | 36.25 | 36.25 |
| 416 | .... | .... | 26.00 | 30.00 | .... | 29.50 | 31.00 | .... | .... | .... |
| 420 | .... | 30.25 | 31.00 | 36.00 | 27.75 | 35.50 | 27.25 | 40.75 | 56.00 | 56.00 |
| 430 | 15.25 | 19.75 | 26.00 | 30.00 | 26.75 | 29.50 | 31.00 | 32.25 | 36.75 | 36.75 |
| 430F | .... | .... | 26.50 | 30.50 | .... | 30.00 | 31.50 | .... | .... | .... |
| 431 | .... | 25.50 | 33.25 | .... | .... | 37.25 | 39.25 | 40.75 | .... | .... |
| 440 | .... | .... | 35.50 | 40.50 | 53.25 | 40.00 | 42.00 | 43.25 | 63.25 | 63.25 |

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co., Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Tube Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp., Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

# Clad Steel

| | Plates—Carbon Base 10% | Plates—Carbon Base 20% | Sheets Carbon Base 20% |
|---|---|---|---|
| 302 | .... | .... | 30.50 |
| 304 | 31.55 | 37.95 | 32.50 |
| 304-L | 34.10 | 40.90 | .... |
| 316 | 36.50 | 42.75 | 47.00 |
| 316-L | 42.30 | 50.10 | .... |
| 316-CB | 42.50 | 50.50 | .... |
| 321 | 33.25 | 39.65 | 37.25 |
| 347 | 36.20 | 44.35 | 48.25 |
| 405 | 26.35 | 33.85 | .... |
| 410 | 28.85 | 33.35 | .... |
| 430 | 28.85 | 33.35 | .... |
| Inconel | 50.00 | 65.95 | .... |
| Nickel | 41.60 | 56.15 | .... |
| Nickel, Low Carbon | 43.80 | 60.55 | .... |
| Monel | 44.50 | 60.50 | .... |
| Copper* | .... | .... | 46.00 |

| | Strip, Carbon Base—Cold Rolled 10% | Strip, Carbon Base—Cold Rolled Both Sides |
|---|---|---|
| Copper* | 33.40 | 42.15 |

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

# Tool Steel

| Grade | $ per lb | Grade | $ per lb |
|---|---|---|---|
| Regular Carbon | 0.275 | 5% Cr Hot Work | 0.430-0.460 |
| Extra Carbon | 0.330 | W-Cr Hot Work | 0.450 |
| Special Carbon | 0.390 | V-Cr Hot Work | 0.470 |
| Oil Hardening | 0.430 | Hi-Carbon-Cr | 0.770 |

Grade by Analysis (%)

| W | Cr | V | Co | Mo | $ per lb |
|---|---|---|---|---|---|
| 20.25 | 4.25 | 1.6 | 12.25 | .... | 4.090 |
| 18.25 | 4.25 | 1 | 4.75 | .... | 2.305-2.475 |
| 18 | 4 | 2 | 9 | .... | 2.675-2.6775 |
| 18 | 4 | 2 | .... | .... | 1.765 |
| 18 | 4 | 1 | .... | .... | 1.600 |
| 13.75 | 3.75 | 2 | 5 | .... | 2.345 |
| 13.5 | 4 | 3 | .... | .... | 1.855 |
| 9 | 3.5 | .... | .... | .... | 1.180 |
| 6 | 4 | 2 | .... | 5 | 1.105 |
| 6 | 4 | 3 | .... | 6 | 1.350 |
| 1.5 | 4 | 1 | .... | 8.5 | 0.960 |

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, M14, S8, U4, V2 and V3.

# Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

| *Birmingham District* | Basic | No. 2 Foundry | Malleable | Bessemer |
|---|---|---|---|---|
| AlabamaCity,Ala. R2 | 54.50 | .... | .... | .... |
| Birmingham R2 | 54.50 | 55.00‡ | .... | .... |
| Birmingham U6 | .... | 55.00‡ | 59.00 | .... |
| Woodward,Ala. W15 | 54.50 | 55.00‡ | 59.00 | .... |
| Cincinnati, deld. | .... | 62.70 | .... | .... |
| ***Buffalo District*** | | | | |
| Buffalo H1, R2 | 60.00 | 60.50 | 61.00 | 61.50 |
| Tonawanda,N.Y. W12 | 60.00 | 60.50 | 61.00 | 61.50 |
| N.Tonawanda,N.Y. T9 | .... | 60.50 | 61.00 | 61.50 |
| Boston, deld. | 70.65 | 71.15 | 71.65 | .... |
| Rochester,N.Y., deld. | 63.02 | 63.52 | 64.02 | .... |
| Syracuse,N.Y., deld. | 64.12 | 64.62 | 65.12 | .... |
| ***Chicago District*** | | | | |
| Chicago I-3 | 60.00 | 60.50 | 60.50 | 61.00 |
| Gary,Ind. U5 | 60.00 | .... | 60.50 | .... |
| S.Chicago R2 | 60.00 | .... | 60.50 | .... |
| S.Chicago,Ill. Y1 | 60.00 | 60.50 | 60.50 | 61.00 |
| S. Chicago,Ill. U5, W14 | 60.00 | .... | 60.50 | 61.00 |
| Milwaukee, deld. | 62.30 | 62.80 | 62.80 | 63.30 |
| Muskegon,Mich., deld. | .... | 67.18 | 67.18 | .... |
| ***Cleveland District*** | | | | |
| Cleveland R2, A7 | 60.00 | 60.50 | 60.50 | 61.00 |
| Akron,O., deld. | 63.75 | 63.25 | 63.25 | 63.75 |
| ***Mid-Atlantic District*** | | | | |
| Bethlehem,Pa. B2 | 62.00 | 62.50 | 63.00 | 63.50 |
| NewYork, deld. | .... | 66.51 | 67.01 | .... |
| Newark, deld. | 65.20 | 65.70 | 66.20 | 66.70 |
| Birdsboro,Pa. B10 | 62.00 | 62.50 | 63.00 | 63.50 |
| Chester,Pa. P14 | 62.00 | 62.50 | 63.00 | .... |
| Philadelphia, deld. | 63.76 | 64.26 | 64.76 | .... |
| Steelton,Pa. B2 | 62.00 | 62.50 | 63.00 | 63.50 |
| Swedeland,Pa. A3 | 62.00 | 62.50 | 63.00 | 63.50 |
| Philadelphia, deld. | 63.76 | 64.26 | 64.76 | 65.26 |
| Troy,N.Y. R2 | 62.00 | 62.50 | 63.00 | 63.50 |
| ***Pittsburgh District*** | | | | |
| NevilleIsland,Pa. P6 | 60.00 | 60.50 | 60.50 | 61.00 |
| Pittsburgh (N&S sides), Aliquippa, deld. | .... | 61.95 | 61.95 | 62.45 |
| McKeesRocks, deld. | .... | 61.60 | 61.60 | 62.13 |
| Lawrenceville, Homestead, Wilmerding,Monaca, deld. | .... | 62.26 | 62.26 | 62.79 |
| Verona,Trafford, deld. | 62.29 | 62.82 | 62.82 | 63.35 |
| Brackenridge, deld. | 62.60 | 63.10 | 63.10 | 63.63 |
| Bessemer,Pa. U5 | 60.00 | .... | 60.50 | 61.00 |
| Clairton,Rankin,S.Duquesne,Pa. U5 | 60.00 | .... | .... | .... |
| Midland,Pa. C18 | 60.00 | .... | .... | .... |

| *Youngstown District* | Basic | No. 2 Foundry | Malleable | Bessemer |
|---|---|---|---|---|
| Hubbard,O. Y1 | .... | .... | 60.50 | .... |
| Sharpsville,Pa. S6 | 60.00 | .... | 60.50 | 61.00 |
| Youngstown Y1 | .... | .... | 60.50 | 61.00 |
| Mansfield,O., deld. | 64.90 | .... | 65.40 | 65.90 |
| Duluth I-3 | 60.00 | 60.50 | 60.50 | 61.00 |
| Erie,Pa. I-3 | 60.00 | 60.50 | 60.50 | 61.00 |
| Everett,Mass. E1 | 62.00 | 62.50 | 63.00 | .... |
| Fontana,Calif. K1 | 67.50 | 68.00 | .... | .... |
| Geneva,Utah C11 | 60.00 | 60.50 | .... | .... |
| GraniteCity,Ill. G4 | 61.90 | 62.40 | 62.90 | .... |
| Ironton,Utah C11 | 60.00 | 60.50 | .... | .... |
| LoneStar,Texas L6 | .... | 55.00* | .... | .... |
| Minnequa,Colo. C10 | 62.00 | 62.50 | 63.00 | .... |
| Rockwood,Tenn. T2 | .... | 55.00‡ | 60.50 | .... |
| Toledo,O. I-3 | 60.00 | 60.50 | 60.50 | 61.00 |
| Cincinnati, deld. | 65.76 | 66.26 | .... | .... |

*Phos. 0.51-0.75%; $56. Phos. 0.31-0.50%.
‡Intermediate (Phos. 0.31-0.69%), $56.

## PIG IRON DIFFERENTIALS

*Silicon:* Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

*Manganese:* Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

*Nickel:* Under 0.05% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

## BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.25 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

| | |
|---|---|
| Jackson,O. G2, J1 | 69.00 |
| Buffalo H1 | 70.35 |

## ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18 %; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

| | |
|---|---|
| NiagaraFalls,N.Y. P15 | $92.50 |
| Keokuk,Iowa, Open-hearth & Fdry. (freight allowed K2) | 97.00 |
| Keokuk, O. H. & Fdry, 12½ lb piglets, 16% Si, frgt allowed K2 | 100.00 |

## LOW PHOSPHORUS PIG IRON, Gross Ton

| | |
|---|---|
| Lyles,Tenn. T3 (Phos. 0.035% max) | $72.50 |
| Rockwood,Tenn. T3 (Phos. 0.035% max) | 72.50 |
| Steelton,Pa. B2 (Phos. 0.035% max) | 68.00 |
| Philadelphia, deld. | 71.55 |
| Troy,N.Y. R2 (Phos. 0.035% max) | 68.00 |
| Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max) | 65.00 |
| Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max) | 65.00 |
| Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max) | 65.00 |
| NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max) | 65.00 |

# Warehouse Steel Products

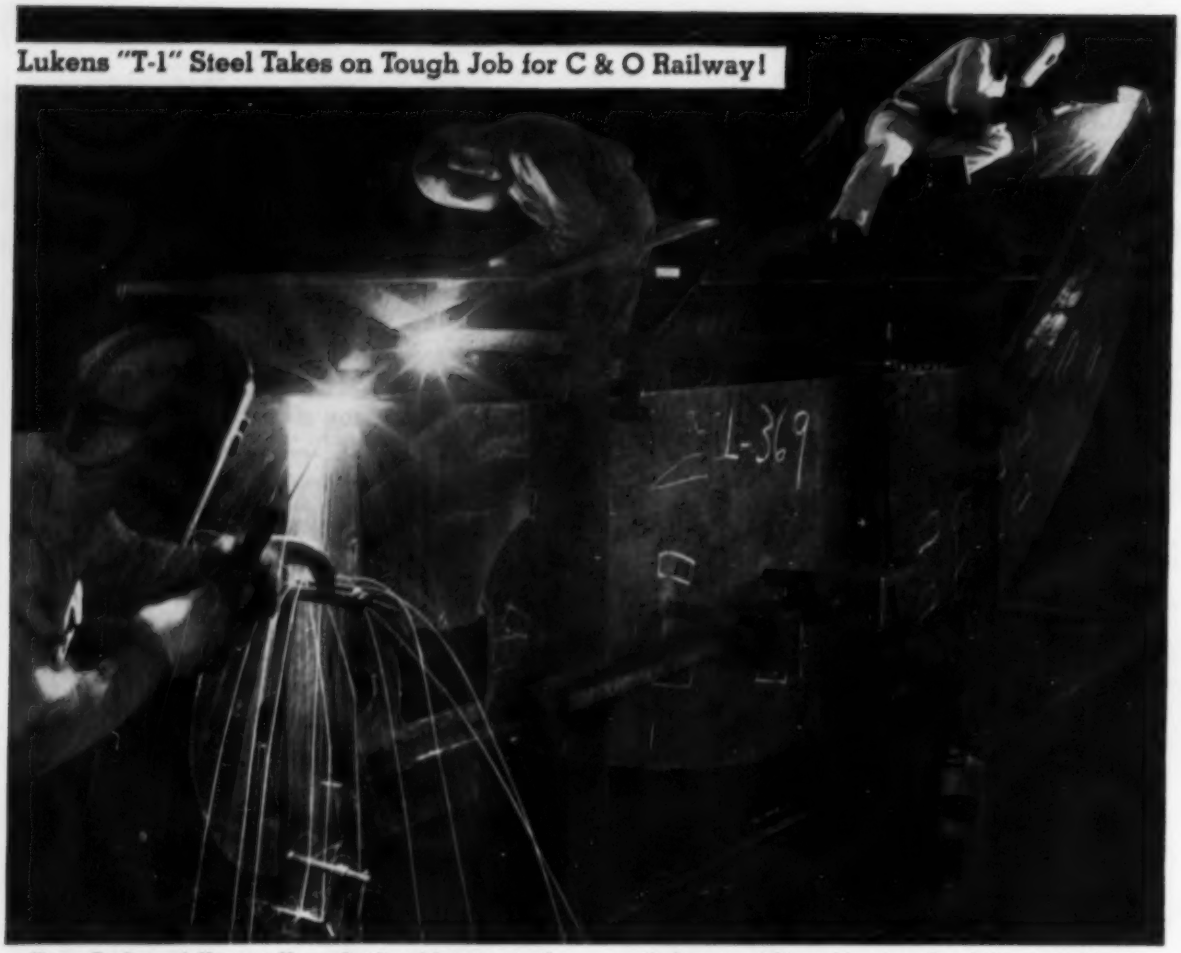
Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: St. Paul, 25 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, San Francisco, 10 cents; Atlanta, Houston, Seattle, Spokane, no charge.

| | SHEETS | | | | STRIP | BARS | | | | Standard Structural Shapes | PLATES | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hot-Rolled | Cold-Rolled | Gal. 10 Ga.† | Stainless Type 302 | Hot-Rolled* | H.R. Merchant Qual. | H.R. Spec. Qual. | C.F. Rds.§ | H.R. Alloy 4140††‡ | | Carbon | Floor |
| Atlanta | 7.14 | 8.20 | 8.87 | .... | 7.40 | 7.42 | ... | 9.39 | .... | 7.63 | 7.49 | 9.43 |
| Baltimore | 7.24 | 8.35 | 8.50 | .... | 7.70 | 7.70 | ... | 8.43[4] | 14.39 | 7.94 | 7.56 | 9.02 |
| Birmingham | 7.13 | 8.24 | 8.85 | .... | 7.21 | 7.27 | 7.80 | 9.35 | .... | 7.43 | 7.45 | 9.50 |
| Boston | 8.12 | 9.07 | 10.32 | 53.32 | 8.21 | 8.21 | 8.76 | 9.86 | 13.66 | 8.27 | 8.41 | 9.84 |
| Buffalo | 7.20 | 8.25 | 10.01 | .... | 7.35 | 7.35 | 8.05 | 7.90 | 13.50 | 7.60 | 7.65 | 9.00 |
| Chattanooga | 7.28 | 8.44 | 8.60 | .... | 7.36 | 7.42 | 7.95 | 9.18 | .... | 7.63 | 7.60 | 9.32 |
| Chicago | 7.13 | 8.24 | 9.10 | 48.75 | 7.21 | 7.27 | 7.80 | 7.75 | 13.15 | 7.43 | 7.45 | 8.72 |
| Cincinnati | 7.25 | 8.23 | 9.10 | 46.10 | 7.45 | 7.51 | 8.04 | 8.15 | 13.40 | 7.90 | 7.74 | 8.97 |
| Cleveland | 7.13 | 8.24 | 8.95 | 49.16 | 7.31 | 7.33 | 7.86 | 8.00 | 13.21 | 7.76 | 7.62 | 8.89 |
| Denver | 8.95 | 10.31 | 11.73 | .... | 9.10 | 9.10 | ... | 9.82 | 17.87 | 8.95 | 9.10 | 10.50 |
| Detroit | 7.32 | 8.43 | 9.38 | 43.80 | 7.49 | 7.55 | 8.08 | 8.04 | 13.39 | 7.90 | 7.73 | 8.91 |
| Erie, Pa. | 7.08 | 8.24 | 8.95[10] | .... | 7.31 | 7.35 | ... | 8.10[10] | .... | 7.65 | 7.30 | 8.79 |
| Houston | 7.85 | 8.75 | 10.49 | .... | 8.15 | 8.25 | ... | 9.85 | 14.00 | 8.20 | 7.80 | 9.20 |
| Jackson, Miss. | 7.46 | 8.52 | 9.22 | .... | 7.44 | 7.50 | 8.12 | 9.44 | .... | 7.75 | 7.77 | 9.44 |
| Los Angeles | 8.15 | 10.00 | 11.00 | 51.50 | 8.50 | 8.15 | 8.70 | 10.90 | 14.40 | 8.30 | 8.75 | 10.85 |
| Milwaukee | 7.22 | 8.33 | 9.19 | .... | 7.30 | 7.36 | 7.89 | 7.94 | 13.24 | 7.60 | 7.54 | 8.81 |
| Moline, Ill. | 7.15 | 8.44 | 8.85 | .... | 7.41 | 7.43 | ... | 8.00 | .... | 7.63 | 7.34 | ... |
| New York | 7.78 | 8.88 | 9.63 | 53.13 | 8.23 | 8.16 | 8.71 | 9.77 | 13.57 | 8.11 | 8.21 | 9.50 |
| Norfolk, Va. | 7.35 | ... | ... | .... | 7.80 | 7.85 | ... | 9.95 | .... | 8.10 | 7.60 | 9.10 |
| Philadelphia | 7.34 | 8.44 | 9.41 | 45.98 | 7.99 | 7.73 | 8.26 | 8.52 | 13.35 | 7.75 | 7.72 | 8.83** |
| Pittsburgh | 7.13 | 8.24 | 9.40 | 49.00 | 7.21 | 7.27 | 7.80 | 8.00 | 13.15 | 7.43 | 7.45 | 8.72 |
| Portland, Oreg. | 7.80 | 8.80 | 10.65 | .... | 8.00 | 7.95 | ... | 12.20 | 15.00 | 7.85 | 7.75 | 9.60 |
| Richmond, Va. | 7.25 | ... | 9.49 | .... | 7.85 | 7.85 | ... | 9.50 | .... | 8.10 | 7.50 | 9.35 |
| St. Louis | 7.42 | 8.53 | 9.60 | 43.59 | 7.50 | 7.56 | 8.09 | 8.29 | 13.44 | 7.83 | 7.74 | 9.01 |
| St. Paul | 7.46 | 8.59 | 9.16 | .... | 7.72 | 7.74 | ... | 8.51 | 13.51 | 7.94 | 7.65 | 9.12 |
| San Francisco | 8.20 | 9.65 | 10.15 | 51.65 | 8.35 | 8.15 | 8.70 | 11.45 | 14.40[8] | 8.25 | 8.30 | 10.50 |
| Seattle | 7.85 | 10.50 | 10.90 | 54.00 | 8.90 | 8.60 | 9.15 | 12.25 | 14.75 | 8.50 | 8.50 | 10.70 |
| Spokane, Wash. | 8.90 | 11.25 | 11.05 | .... | 9.05 | 8.75 | 9.30 | 12.40 | 15.65 | 8.65 | 8.65 | 11.35 |
| Washington | 7.78 | 9.80 | 8.60 | .... | 8.45 | 8.24 | ... | 9.40 | .... | 8.51 | 8.11 | 9.56 |

*Prices do not include gage extras; †prices include gage and coating extras (based on 13.50-cent zinc), except in Birmingham (coating extra excluded); ‡includes 35-cent special bar quality extras; **¼-in. and heavier; ††as annealed; §§under ⅛-in.

Base quantities, 2000 to 4999 lb except as noted; Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 2000 lb except in Chicago, New York and Boston, 10,000 lb, and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [3]—500 to 9999 lb; [4]—400 to 999 lb; [5]—4000 lb and over; [6]—1000 to 1999 lb; [7]—1000 lb and over; [8]—1500 to 3999 lb; [9]—2000 to 3999 lb; [10]—f.o.b. local delivery in lots of 10,000 lb and over; [11]—2000 lb and over.

## Lukens "T-1" Steel Takes on Tough Job for C & O Railway!




Horne Brothers of Newport News, first-line fabricators to the shipping industry, are building several new, improved coal trimming machines for the C & O Railway. Lukens "T-1" steel was specified to cut weight, combine strength and abrasion resistance. A number of other Horne Brothers' projects of Lukens "T-1" steel are already in the works.

*Fabricator of unique new coal loader says:*

# "NEVER WORKED WITH AS TOUGH AND STRONG A STEEL THAT'S SO EASY TO WELD!"

■ *Enthusiastic* is the word for Horne Brothers' reports on Lukens "T-1" steel. They call it the best steel yet to combine strength and toughness, impact and abrasion resistance, and the all-important feature of excellent weldability.

Lukens "T-1" steel is economical, too. On this coal loading machine, for example, Horne Brothers was able to effect a 25% reduction in overall plate thickness—a direct result of this new steel's great strength. The finished machine will weigh far less than previous trimmers, operate with greater efficiency, less maintenance and increased life expectancy.

No wonder Horne Brothers is so well satisfied. No wonder they are planning to build more equipment of Lukens "T-1" steel—*right away!*

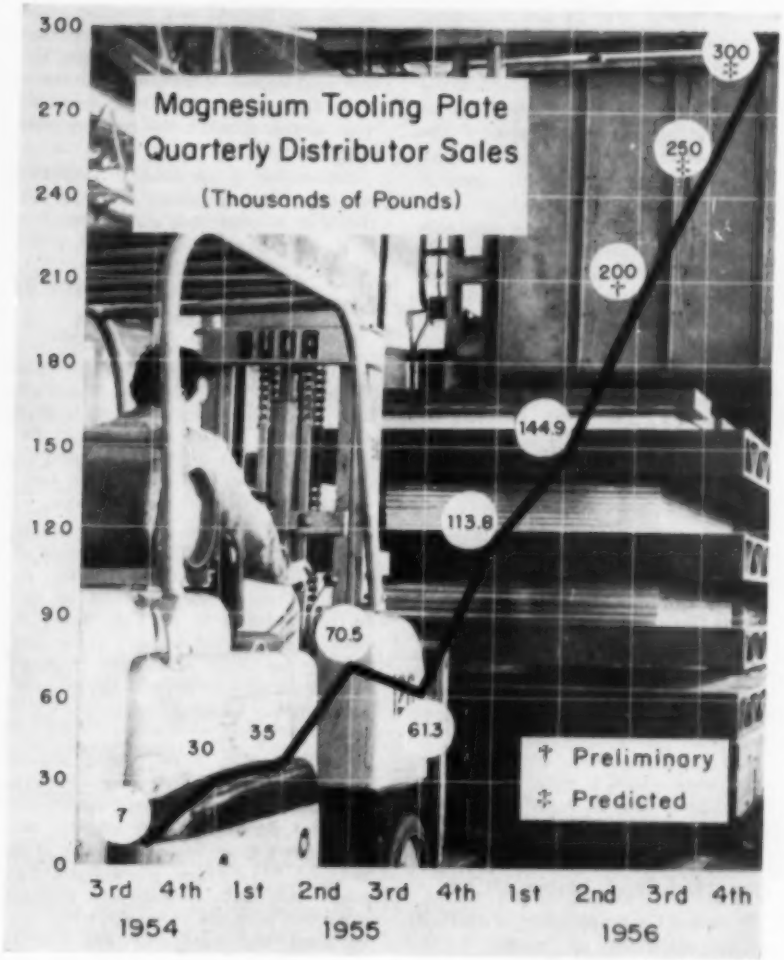
If your problem is equipment weight... abrasion, impact or atmospheric corrosion... the need for toughness at temperature extremes ... it will pay you to investigate this amazing new alloy steel now.

For the latest in fabrication techniques and specifications, write to Manager, Marketing Service, 847 Lukens Building, Lukens Steel Company, Coatesville, Pennsylvania.

# LUKENS "T-1" STEEL

LUKENS

THE NEWEST IN A COMPLETE LINE OF ALLOY STEELS
LUKENS STEEL COMPANY, COATESVILLE, PENNSYLVANIA




Dow Chemical Co.

# Mag Tooling Plate Grows

**Sales this year will more than triple the 1955 volume. Biggest customers are aircraft and electronic companies, but list of applications is growing fast**

DOW Chemical Co., Midland, Mich., expects to sell 1.2 million lb of magnesium tooling plate this year. In 1955, the company sold 350,000 lb.

G. W. de Kuiper, sales manager for magnesium mill products, says: "That doesn't sound like much, but, remember, you have to multiply by four to get the steel weight equivalents."

**Introduction**—Dow first brought out its tooling plate in the second half of 1954. "We'd been eying the market since 1946, but didn't have the facilities to make it until our new rolling mill opened in May, 1954," adds Mr. De Kuiper.

The company soon found that distributors were the best outlet. Today, five distributors handle most of the sales, although Dow still does some direct selling to larger companies.

**Advantages**—The three biggest advantages of magnesium plate are low cost, light weight, good machinability. It competes with cast and stretcher leveled aluminum tooling plate.

Dow has settled on one grade (AZ 31). It finds a standard size (96 in. long by 48 in. wide and ¼ to 3 in. thick) is the most popular, but it makes other grades and sizes to order.

**Cost**—The mill base price for a cubic inch of magnesium tooling plate is 4.5 cents. Cast aluminum is 5.4 cents. Rolled aluminum is 4.2 cents.

A magnesium plate (96 x 48 x 1 in.) costs $207.09 at mill base prices. A similar cast aluminum plate is $283.67. Stretcher leveled (6061-T66) rolled aluminum costs $192.55.

**Steel**—In some cases, magnesium offers an advantage over steel plate. Donald M. Johnson, Dow's tooling plate specialist, magnesium technical service and development department, puts it this way:

"If a shop has to flame cut and roll the edges on 1 in. slab steel, and if labor and capital investment costs are more than $3 an hour, it usually pays to use magnesium."

**Weight**—Mag's weight is two-thirds that of aluminum, less than one-fourth that of steel. Most states have laws limiting the number of pounds a worker can lift. Lightness saves time and handling costs.

One of Dow's aircraft customers cites this example: "An aluminum spotweld jig or check fixture weighing 75 lb would require two men to lift. The same fixture of magnesium would weigh only 48 lb and could be lifted by one man." Weight savings are even more important where women are employed, or where overhead storage calls for lift trucks or other mechanical handling systems.

**Machining** — Magnesium's flatness, high stress relief and typical tensile strengths (about 35,000 psi) make it a natural for jig and fixture work. It can be shaped easily for intricate checking fixtures.

Although some users have criticized magnesium plate as lacking in dimensional stability, Mr. Johnson points out that in every case, these faults were traced to dull tools or low and irregular cutting speeds.

Dow recommends dry machining where possible. A comparison test indicates it takes about 8 seconds to drill a ¼-in. hole through 1 in. magnesium plate; 14 seconds for cast aluminum; 41 seconds for rolled aluminum and from 80 to 100 seconds for hot-rolled steel plate. Drilling is dry. Bits are changed between each test.

**Applications** — Most magnesium tooling plate goes to aircraft and electronic concerns. It's also catching on in appliance and auto industries. Tool and die workers who learned how to handle magnesium

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during World War II are beginning to push it to their customers.

Uses include profile templates for milling machines, contour-checking fixtures for castings, auto frame checking fixtures and deep draw dies for aluminum stampings. One Chicago firm is using magnesium instead of slate for pool table tops.

Mr. De Kuiper feels Dow has only scratched the surface in finding more customers and more uses for its lightweight plate. With today's shortage of plate steel, it may pay some companies to take another look at magnesium.

## Tool Steel . . .

**Tool Steel Prices, Page 226**

Shipments of high speed and tool steel (excluding hollow drill steel) totaled 11,720 net tons in April, reports the American Iron & Steel Institute. This compares with 11,370 tons in March, and 9786 tons in April, 1955.

In the first four months this year, 44,816 tons were shipped. This was substantially above the 35,220 tons shipped in the corresponding period of last year.

Of total shipments in April, 1682 tons were class A high speed steel, 365 tons class B high speed, and 9990 tons, were other tool steels.

## Imported Steel Easier

Demand for imported steel is slackening, reflecting an easing in the outlook here over the next two or three months. Barring a reduction of 10 cents per 100 lb in wire nails, quotations of western continental European countries are unchanged on all major items.

Delivery promises are easier. On structurals they average more than five months; on heavy plates, five to six months; and on light plates, two to three months. Merchant bars can be had in four to five months; reinforcing bars, two to three months; and sheets around 30 days, both hot and cold rolled. Wire products are a little tighter, around three months, nails at two months. Oil country pipe is scarce.

Cold-rolled (drawing quality) sheets are being quoted at $9.10 per 100 lb at Atlantic and gulf ports, and $9.45 at west coast ports.

## Sheets, Strip . . .

**Sheet & Strip Prices, Pages 223 & 224**

Sheet and strip consumers are showing slight interest in third quarter tonnage. Some sellers believe August will be the low point of the year. From an over-all standpoint, demand has held up better than anticipated two or three weeks ago.

Some orders are in for an early spot on mill schedules in case of a strike, but this volume is light. In some instances tonnage will be deferred if there is no suspension in operations. Most other users are holding up July and some August shipments in any event. Inventories are as heavy as most consumers want to carry.

Auto makers have placed orders for special grades of sheet through the third quarter. Their purchases for that period are only slightly below those for the second quarter. The bulk of cold-finished sheet mills discover that auto makers are placing orders on a month-to-month basis and in some instances only one month ahead. Auto producers have given up a portion of their July quotas, but the extra tonnage is not being snapped up as quickly as was the case in May and early June.

Steel mills which have no strong commitments for third quarter production are hesitating to change their product mix. They suggest that more hot-rolled and galvanized sheet and tin plate may be available in the

## Steel Import Prices

(Base per 100 lb, landed, duty paid. Source of shipment: Western continental European countries)

| | North Atlantic | South Atlantic | Gulf Coast | West Coast |
|---|---|---|---|---|
| Deformed Bars, Intermediate, ASTM-A-305 | $6.80 | $6.80 | $6.80 | $7.20 |
| Bar Size Angles | 6.75 | 6.75 | 6.75 | 7.15 |
| Structural Angles | 7.05 | 7.05 | 7.05 | 7.45 |
| I-Beams | 7.45 | 7.45 | 7.45 | 7.85 |
| Plates | 8.50 | 8.50 | 8.50 | 8.90 |
| Sheets, H.R. | 8.75 | 8.75 | 8.75 | 9.15 |
| *Sheets, C.R. (drawing quality)* | *9.10* | *9.10* | *9.10* | *9.45* |
| Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft | 26.50 | 26.50 | 26.50 | 30.46 |
| Barbed Wire (†) | 6.50 | 6.50 | 6.50 | 6.85 |
| Merchant Bars | 6.80 | 6.80 | 6.80 | 7.20 |
| Hot-Rolled Bands | 7.10* | 7.10* | 7.10* | 7.50* |
| Wire Rods, Thomas Commercial No. 5 | 6.50 | 6.50 | 6.50 | 6.90 |
| Wire Rods, O-H Cold Heading Quality No. 5 | 6.90 | 6.90 | 6.90 | 7.30 |
| *Bright Common Wire Nails* | *7.50* | *7.50* | *7.50* | *7.80* |

Oil Country Pipe: Prices on all sizes equalized with Pittsburgh plus barge freight to New Orleans and Houston, where available.

*Nominal. †Per 82-lb. net, reel. ‡Per 100-lb kegs, 20d nails and heavier

next quarter if cold-finished sheet demand continues to decline.

While cold-finished sheet demand is less active than for hot-rolled, at least one eastern producer will have a larger carry-over in cold sheets than in hot material at the end of this quarter. This is explained in part by the mill overselling in anticipation of cutbacks greater than those which developed in this grade.

## Wire . . .

Wire Prices, Pages 224 & 225

Were it not for hedge buying, merchant wire products, which can be had for nearby shipment, would be moving slowly in the East.

Manufacturers wire items are in more pressing demand with delivery promises extending into August in most cases. Business, generally is spotty, however.

Welded wire fabric continues in strong demand.

Consumers' inventories are generally in balance. Third quarter buying for the automotive industry is slow, and declines in operations of screw manufacturers and typewriter builders are reported ahead of the usual vacation slackening.

## Plates . . .

Plate Prices, Page 222

Platemakers will go into third quarter with substantial carryover, extending three weeks or more in most cases. Two eastern mills last week blanked out July production to care for their arrearages, and in this action they are following policy announced earlier by other makers in opening books for third quarter business.

Demand for third quarter will be in excess of available supply and the shortage is seen extending into fourth quarter. Increasing amounts of strip plate, particularly in the Midwest, are helping consumers of light plate, but the volume is falling far short of requirements. There has been no easing whatsoever in supply as regards the heavy gages. For the most part, deliveries are running one to two months behind schedule.

In addition to carbon plate, specialties are in strong demand. Floor plate is active but there is little evidence this specialty is being used as a substitute for plain plate, as was the case during the war. Then it was fairly common to see medium size storage tanks, even fabricated pipe, being made of floor plate.

There may be some limited substitutions today, such, for instance, as for truck flooring, tonnages for which might be moving through jobbers. It


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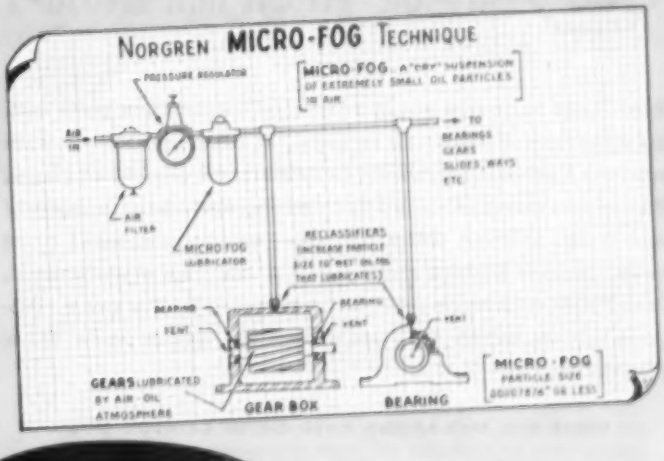


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is difficult to pin down such substitutions, but the fact remains floor plate, for some time past, has been moving at a rather abnormally good rate to fabricators.

Most plate producers expect to operate at as high a level in July as seasonal conditions will permit, assuming, of course, there will be no strike. On the basis of likely carryovers and new tonnage on their books, this is virtually assured, though producers say there is some question as to how firm some of the orders on their books are. Shipyards will take more tonnage.

## Stainless Steel . . .

Stainless Steel Prices, Page 226

Producers of stainless steel sheet and fabricators of strip selling to the automotive industry are experiencing a decline in orders for July delivery. Two producers are operating at 10 per cent below levels of a month ago.

Slowness is most evident in strip sales. A company producing stainless plate for industrial equipment, such as heat exchangers, reports equipment makers are taking all the stainless they can get. Result: Steelmakers' order books for plate are filled through September, while there are some extra bar and sheet tonnages available for August delivery.

Nickel continues a limiting factor in sales of stainless steel, despite the slowdown in orders.

## Steel Bars . . .

Bar Prices, Page 222

Carbon bar business is definitely off from what it was a month ago, but volume still is described as good by producers. This is particularly so in the heavier rounds, flats and squares.

Cold-finished bar buyers are pushing hard to get in tonnage over the next two or three weeks in an effort to beat an expected price increase. They are not showing much interest beyond that period.

Alloys are in moderate demand. Nickel bearing steels are in strong demand, and the nickel supply problem is expected to grow worse over remainder of the year.

Generally, producers anticipate no severe drop in volume in the third quarter and see an upturn in business in the fourth quarter, but many sellers think the average rate of production in the fourth quarter will fall short of that for the first half.

Consumers have placed orders for the tonnages they will require in early third quarter, and their inventories, generally, are considered sizable. A producer of alloy bars at Pittsburgh says sales to farm equipment makers continue to be poor, and that sales to specialty manufacturers, such as lawn mower blade producers, are declining.

## Tubular Goods . . .

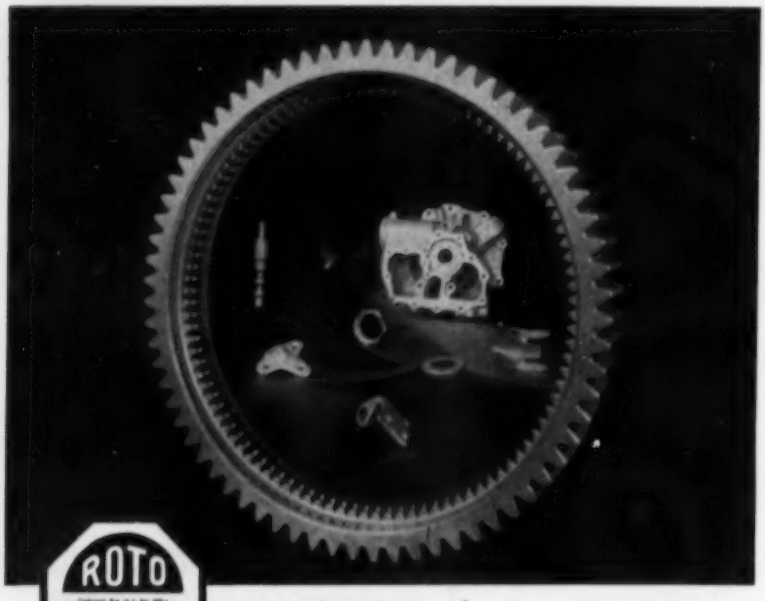
Tubular Goods Prices, Page 226

Sellers of oil country tubular goods expect strong third quarter sales, basing their expectations on well drillers' low inventories and normal heavy summer requirements for pipe. Stocks are said to be so low that a shortage of high-alloy tubing could slow drilling later this year.

Construction and utility demand continues to grow for pressure tubing, but some softness in demand for mechanical tubing is noted.

Buttweld pipe is moving fairly well in the East. Demand in general is being stimulated by a certain amount of protective covering. Business in lapweld and seamless continues brisk, with deliveries well extended into the third quarter. St. Louis area mills are reported oversold on buttweld for June shipment, and they have booked substantial tonnage for July shipment.

The Union Oil Co. of California

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soon will sign contracts for construction of a 225-mile pipeline from the San Joaquin Valley to the company's refinery at Oleum on San Francisco bay. Twelve and sixteen-in. pipe will be used.

Wheeling Steel Corp. plans expenditures of $3.5 million for improvements and modernization of its Benwood Works. Major part of the expenditures will go for pipe finishing and warehousing facilities.

Proposed increases of $10 to $15 a ton with escalator clauses, effective July 1, have stimulated municipal interest in cast iron pipe in the Pacific Northwest, and several sizable jobs have come out for bids.

A strike of 700 workers at the Birmingham pipe plant of the U. S. Pipe & Foundry Co. is in its fifteenth week.

## Warehouse . . .

Warehouse Prices, Page 227

Distributors are confronted with more demand for hard-to-obtain products such as plates and shapes, than they can handle. Sales are increasing also in bars and sheets to firms which were unable to book tonnage with mills in the second quarter and which want to be protected against the possibility of a strike.

Distributors believe that continued active demand is not due primarily to protective covering; too much tonnage, they say, is being ordered cut to size, indicating specific use.

Warehouses can fill all bar and sheet orders without difficulty as they are receiving offers of extra tonnages from the mills. Wide-flanged beams and other structural shapes continue to arrive from the mills one or two months behind scheduled delivery dates.

June may be the best month this year as far as warehouse sales are concerned.

## Tin Plate . . .

Tin Plate Prices, Page 224

Shipments of metal cans during the first four months of this year amounted to 1,404,384 tons, compared with 1,175,276 in the like period of 1955, reports the Census Bureau. April shipments were 480,301 tons, against 330,536 in March and 326,091 in April, 1955.

Movement of fruit and vegetable cans during the first four months totaled 377,036 tons, compared with 261,531 in the same period of 1955. April shipments of 177,323 tons were up sharply from 72,379 in March and 70,030 in April last year.

Beer cans (second largest category) totaled 216,605 tons in the first four months, against 198,328 in the same period last year. April shipments were 67,866 tons, compared with 60,353 in March and 63,779 in April, 1955.

## Reinforcing Bars . . .

Reinforcing Bar Prices, Page 222

Although reinforcing bar distributors are booked up to three months ahead, demand is reported somewhat easier at certain points with supplies improving. In New England, a leading Pittsburgh mill is selling billet steel bars in standard lengths for the first time in a number of years.

Of major construction steel products, reinforcing bars are in less critical supply than structurals and piling. Total mill shipments are approximately 40 per cent over 1955's.

During April, a record 228,483 net tons of concrete reinforcing bars were shipped from steel mills. This compares with the former high of 217,321 tons shipped in March. In the first four months of this year, shipments amounted to 801,843 net tons. This compares with 589,434 tons shipped in the like period a year ago.

Close to 5500 tons of bars are ac-

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tively pending in New England, 4255 tons being for Connecticut turnpike structures estimated for June 18 and 25. Bids are asked on June 22 for 138 housing units at Ft. Lewis, Wash., involving an unstated tonnage of bars. Highway projects in the Pacific Northwest are taking considerable reinforcing steel.

## Ferroalloys . . .

Ferroalloy Prices, Page 234

Production of silicon alloys during the first quarter (263,586 short tons) was over 29 per cent greater than in the like period of 1955, and 5 per cent above output in the fourth quarter last year, reports the U. S. Bureau of Mines. Shipments to domestic furnaces (230,073 short tons) rose 11 per cent over the first quarter last year, but were 11 per cent below the preceding quarter.

Imports of ferrosilicon (all from Canada) dropped 74 per cent, compared with the same period of 1955, and were 68 per cent less than in the fourth quarter last year.

## April Steel Shipments Large

Less steel was shipped in April than in the preceding month, but the movement was the second highest monthly total on record, reports the American Iron & Steel Institute. Shipments for the month amounted to 7,783,873 net tons, topped only by the 8,255,824 tons moved in March this year.

During April, a record 228,483 net tons of concrete reinforcing bars were shipped. This compares with the former high of 217,321 tons moved in March. Steel plate shipments were 712,496 tons, up slightly from March. The movement of structural shapes was 477,807 net tons, compared with the record 485,393 moved in March.

The five top ranking steel products shipped in April are shown in the accompanying table, compared with March, and with April a year ago.

Warehouses and distributors comprised the largest market classification for shipments in April, accounting for 1,491,755 net tons, or 20.2 per cent of total domestic shipments. The five largest steel consuming categories, with comparisons, are listed in the accompanying table.

Shipments of Leading Steel Products
(Thousands of net tons)

| | April, 1956 | March, 1956 | April, 1955 |
|---|---|---|---|
| Sheets, CR | 1,191 | 1,327 | 1,273 |
| Bars, HR | 801 | 877 | 747 |
| Sheets, HR | 798 | 853 | 792 |
| Plates | 712 | 707 | 560 |
| Tin Plate, Electro. | 555 | 598 | 444 |

Shipments by Market Classification
(Thousands of net tons)

| | April, 1956 | March, 1956 | April, 1955 |
|---|---|---|---|
| Warehouses | 1,492 | 1,563 | 1,342 |
| Automotive | 1,153 | 1,404 | 1,634 |
| Construction | 898 | 948 | 829 |
| Containers | 811 | 859 | 643 |
| Machinery, etc. | 474 | 485 | 395 |

## Metallurgical Coke . . .

Metallurgical Coke Prices, Page 237

Demand for foundry coke is dragging. There is little, if any, inventory building as a hedge against higher prices or a steel strike at midyear. One reason the strike influence is lacking is that in the Midwest, at least, foundry coke is produced largely by utilities which would be unaffected by a strike in steel.

## Rails, Cars . . .

Track Material Prices, Page 235

The Chicago & Northwestern Railroad plans construction of a freight car repair shop at Clinton, Iowa. Scheduled for completion early next year, it will have annual capacity for building 1000 new cars and repairing 7000 old ones. The facility will be the road's second completely enclosed all-weather shop. The other is in Chicago.

## Record Steel Output in May

Steel production in May exceeded 10 million net tons for the eighth consecutive month, reports the American Iron & Steel Institute. At 10,496,000 tons, it not only established a new record for that month, but brought the total for the first five months up to a new high for such a period—52,904,135 tons. This compares with 47,459,835 in the like period last year.

May output compared with 10,328,316 tons for the like month a year ago, and 10,536,121 tons in April.

The Institute's preliminary report shows that steelmaking furnaces during the month operated at an average of 96.3 per cent of the Jan. 1, 1956, capacity, which is rated at 128,363,090 net tons per year. The rate for April was 99.9 per cent. Over the first five months, the furnaces operated at 99 per cent.

The index of steel production (1947-49 equals 100) was 147.5 in May against 153 in April and 145.2 in May a year ago.

| Period | OPEN HEARTH Net tons | OPEN HEARTH Per cent of capacity | OPEN HEARTH ‡Index | BESSEMER Net tons | BESSEMER Per cent of capacity | BESSEMER ‡Index | ELECTRIC Net tons | ELECTRIC Per cent of capacity | ELECTRIC ‡Index | TOTAL Net tons | TOTAL Per cent of capacity | TOTAL ‡Index | Calculated weekly production (Net tons) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1956 | | | | | | | | | | | | | |
| January | 9,676,151 | 101.4 | 151.1 | 323,235 | 79.5 | 92.0 | 828,845 | 86.6 | 232.1 | 10,828,231 | 99.3 | 152.2 | 2,444,296 |
| February | 9,043,064 | 101.3 | 150.9 | 296,543 | 78.0 | 90.2 | 779,388 | 87.1 | 233.3 | 10,118,995 | 99.2 | 152.1 | 2,444,202 |
| March | 9,795,263 | 102.7 | 152.9 | 310,080 | 76.3 | 88.2 | 819,465 | 85.7 | 229.4 | 10,924,788 | 100.2 | 153.6 | 2,466,092 |
| 1st Quarter | 28,514,478 | 101.8 | 151.6 | 929,838 | 77.9 | 90.2 | 2,427,698 | 86.5 | 231.5 | 31,872,014 | 99.6 | 152.6 | 2,451,693 |
| *April | 9,453,280 | 102.4 | 152.5 | 306,388 | 77.9 | 90.1 | 776,453 | 83.9 | 224.6 | 10,536,121 | 99.9 | 153.0 | 2,455,972 |
| †May | 9,377,000 | 98.3 | 146.4 | 298,000 | 73.3 | 84.8 | 821,000 | 85.9 | 229.9 | 10,496,000 | 96.3 | 147.5 | 2,369,000 |
| 1955 | | | | | | | | | | | | | |
| January | 8,054,345 | 86.0 | 125.7 | 199,229 | 49.0 | 56.7 | 584,162 | 63.6 | 163.6 | 8,837,736 | 82.7 | 124.2 | 1,994,974 |
| February | 7,734,884 | 91.5 | 133.7 | 197,091 | 53.7 | 63.1 | 564,959 | 65.1 | 175.1 | 8,496,934 | 88.0 | 132.2 | 2,124,233 |
| March | 9,060,026 | 96.7 | 141.4 | 255,495 | 62.8 | 72.7 | 666,235 | 72.6 | 186.5 | 9,981,754 | 93.4 | 140.3 | 2,253,281 |
| 1st Quarter | 24,849,255 | 91.4 | 133.6 | 651,813 | 55.2 | 63.9 | 1,815,356 | 68.1 | 175.1 | 27,316,424 | 88.0 | 132.3 | 2,124,139 |
| April | 8,858,549 | 97.7 | 142.9 | 275,069 | 69.8 | 80.9 | 681,477 | 76.6 | 197.2 | 9,815,095 | 94.8 | 142.6 | 2,287,901 |
| May | 9,307,291 | 99.4 | 145.3 | 305,347 | 75.1 | 86.9 | 715,678 | 77.9 | 200.4 | 10,328,316 | 96.6 | 145.2 | 2,331,448 |
| June | 8,764,430 | 96.6 | 141.4 | 283,544 | 72.0 | 83.4 | 696,493 | 78.6 | 202.1 | 9,746,467 | 94.1 | 141.6 | 2,271,904 |
| 2nd Quarter | 26,930,270 | 97.9 | 143.2 | 863,960 | 72.3 | 83.8 | 2,095,648 | 77.7 | 199.9 | 29,889,878 | 95.2 | 143.1 | 2,297,454 |
| 1st 6 Months | 51,779,525 | 94.7 | 138.5 | 1,515,773 | 63.8 | 73.9 | 3,911,004 | 72.9 | 187.5 | 57,206,302 | 91.6 | 137.7 | 2,211,299 |
| July | 8,232,535 | 88.1 | 128.8 | 268,346 | 66.1 | 76.4 | 600,063 | 65.5 | 168.0 | 9,100,946 | 85.3 | 127.9 | 2,059,038 |
| August | 8,600,612 | 91.8 | 134.3 | 298,972 | 73.5 | 85.1 | 745,888 | 84.1 | 215.8 | 9,882,325 | 90.7 | 143.5 | 2,308,954 |
| September | 8,829,266 | 97.6 | 142.4 | 307,171 | 78.2 | 90.3 | 694,000 | 75.7 | 194.6 | 9,594,545 | 89.7 | 134.9 | 2,165,812 |
| 3rd Quarter | 25,662,413 | 92.4 | 135.0 | 874,491 | 72.6 | 83.9 | 2,040,912 | 75.0 | 192.5 | 28,577,816 | 90.2 | 135.4 | 2,176,528 |
| 9 Months | 77,441,938 | 93.9 | 137.3 | 2,390,264 | 66.8 | 77.2 | 5,951,916 | 73.6 | 189.2 | 85,784,118 | 91.1 | 136.9 | 2,199,592 |
| October | 9,369,704 | 100.0 | 146.3 | 330,150 | 81.2 | 94.0 | 801,196 | 87.3 | 224.3 | 10,501,050 | 98.2 | 147.6 | 2,370,440 |
| November | 9,141,244 | 100.8 | 147.5 | 306,674 | 77.9 | 90.2 | 799,480 | 89.9 | 231.3 | 10,247,398 | 99.0 | 148.8 | 2,388,671 |
| December | 9,406,531 | 100.7 | 146.9 | 292,429 | 72.1 | 83.2 | 804,559 | 87.8 | 225.3 | 10,503,519 | 98.5 | 147.6 | 2,376,362 |
| 4th Quarter | 27,917,479 | 100.5 | 146.9 | 929,253 | 77.0 | 89.1 | 2,405,235 | 88.3 | 226.9 | 31,251,967 | 98.6 | 148.0 | 2,378,384 |
| Last Half | 53,579,892 | 96.5 | 140.9 | 1,803,744 | 74.8 | 86.5 | 4,446,147 | 81.7 | 209.7 | 59,829,783 | 94.4 | 141.7 | 2,277,495 |
| Total 1955 | 105,359,417 | 95.6 | 139.7 | 3,319,517 | 69.3 | 80.2 | 8,357,151 | 77.3 | 198.7 | 117,036,085 | 93.0 | 139.7 | 2,244,651 |

Note—The percentages of capacity operated are calculated on weekly capacities in 1956 of 2,154,144 net tons open hearth, 91,810 net tons bessemer and 215,939 net tons electric ingots and steel for castings, total 2,461,893 net tons; based on annual capacities as of Jan. 1, 1956, as follows: Open hearth 112,317,040 net tons, bessemer 4,787,060 net tons, electric 11,259,050 net tons, total 128,363,090 net tons.

Note—The percentages of capacity operated are calculated on weekly capacities in 1955 of 2,114,196 net tons open hearth, 91,810 net tons bessemer and 207,272 net tons electric ingots and steel for castings, total 2,413,278 net tons; based on annual capacities as of Jan. 1, 1955, as follows: Open hearth 110,234,160 net tons, bessemer 4,787,060 net tons, electric 10,807,150 net tons, total 125,828,310 net tons.

*Revised. †Preliminary figures, subject to revision. ‡Index of production based on average weekly production of the three years 1947-1948-1949.

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**Specifications of ELECTROMET Electrolytic Manganese**

***Analysis:*** Manganese 99.9% min. (on metallic basis)

Nitrogen-bearing Grade — approx. 93% manganese
approx. 6% nitrogen

Dehydrogenated material is available.

***Packaging:*** Usually packed in steel drums holding 500 lb. of material. Smaller packages available at small premium.

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# Ores

**Lake Superior Iron Ore**

(Prices effective for the 1956 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports)

| | |
|---|---|
| Old range bessemer | $11.25 |
| Old range nonbessemer | 11.10 |
| Mesabi bessemer | 11.00 |
| Mesabi nonbessemer | 10.85 |
| Open-hearth lump | 12.10 |
| High phos. | 10.83 |

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Dec. 1, 1955, and increases or decreases after such date are for seller's account.

**Eastern Local Iron Ore**

Cents per unit, deld. E. Pa.

| | |
|---|---|
| Foundry and basic 52-62% concentrates contract | 17.00-18.00 |

**Foreign Iron Ore**

Cents per unit, c.i.f. Atlantic ports

| | |
|---|---|
| Swedish basic, 65% | 25.00 |
| N. African hematite (spot) | nom. 24.00-25.00 |
| Brazilian iron ore, 68-69% | 33.00 |

**Tungsten Ore**

Net ton unit, before duty

| | |
|---|---|
| Foreign, wolframite, good commercial quality | $33.00-$35.50 |
| Domestic, scheelite, mine | 63.00 |

**Manganese Ore**

Mn 48%, delivery within six months, $1.30-$135 nom., per long ton unit, c.i.f U. S. ports, duty for buyer's account; 46-47%, $1.05-$1.10 nom.

**Chrome Ore**

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

*Indian and African*

| | |
|---|---|
| 48% 2.8:1 | nom. $45.00-$50.00 |
| 48% 3:1 | 42.00-44.00 |
| 48% no ratio | 34.00 |

*South African Transvaal*

| | |
|---|---|
| 44% no ratio | $26.00-28.00 |
| 48% no ratio | 33.00-35.00 |

*Domestic*

Rail nearest seller

| | |
|---|---|
| 48% 3:1 | $39.00 |

**Molybdenum**

| | |
|---|---|
| Sulphide concentrate, per lb of Mo content, mines, unpacked | $1.10 |

**Antimony Ore**

Per unit of Sb content, c.i.f. seaboard

| | |
|---|---|
| 55-60% | $3.40-$3.85 |
| 60-65% | 3.85-3.95 |

**Vanadium Ore**

Cents per lb $V_2O_5$ content, deld. mills

| | |
|---|---|
| Domestic | 31.00 |

# Refractories

**Fire Clay Brick (per 1000)**

***High-Heat Duty:*** Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $122; Salina, Pa., $127; Niles, O., $133.

***Super-Duty:*** Ironton, O., Vandalia, Mo., Olive Hill, Ky., Clearfield, Pa., New Savage, Md., St. Louis, $150.

**Silica Brick (per 1000)**

***Standard:*** Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Windham, Portsmouth, O., Hawstone, Pa., $128; Warren, Niles, O., Hays, Pa., $133; Morrisville, Pa., $131.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $138; Lehigh, Utah, $144; Los Angeles, $151.

***Super Duty:*** Hays, Sproul, Hawstone, Pa., Niles, Warren, Windham, O., Leslie, Md., Athens, Tex., $145; Morrisville, Pa., $148; Joliet, Ill., $151; Curtner, Calif., $163.

**Semisilica Brick (per 1000)**

Clearfield, Pa., $139; Philadelphia, $124; Woodbridge, N. J., $122.

**Ladle Brick (per 1000)**

***Dry Pressed:*** Aisey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Vandalia, Mo., $88.50; Wellsville, O., $82.50; Clearfield, Pa., Portsmouth, O., $98.

**High-Alumina Brick (per 1000)**

***50 Per Cent:*** St. Louis, Mexico, Vandalia, Mo., $194; Danville, Ill., $197; Philadelphia, Clearfield, Pa., $201.

***60 Per Cent:*** St. Louis, Mexico, Vandalia, Mo., $241; Danville, Ill., $244; Philadelphia, Clearfield, Pa., $248.

***70 Per Cent:*** St. Louis, Mexico, Vandalia, Mo., $279; Danville, Ill., $281; Philadelphia, Clearfield, Pa., $286.

**Sleeves (per 1000)**

Republic, Johnstown, Bridgeburg, Pa., $157; Clearfield, Pa., $158.50; St. Louis, $169.30.

**Nozzles (per 1000)**

Republic, Pa., $253.70; Johnstown, Pa., $259.20; Clearfield, Pa., $259.40; St. Louis, $259.45; Bridgeburg, Pa., $258.

**Runners (per 1000)**

Republic, Johnstown, Bridgeburg, Pa., $196; Clearfield, Pa., $198; St. Louis, $195.80.

**Dolomite (per net ton)**

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Narlo, O., $15; Thornton, McCook, Ill., $15.60; Dolly Siding, Bonne Terre, Mo., $14.

**Magnesite (per net ton)**

Domestic, dead-burned, bulk, ⅛-in. grains with fines: Chewelah, Wash., $40; Luning, Nev., $40. ⅜-in. grains with fines: Baltimore, $66.40.

# Metallurgical Coke

Price per net ton

**Beehive Ovens**

| | |
|---|---|
| Connellsville, furnace | $13.75-14.50 |
| Connellsville, foundry | 16.00-17.00 |

**Oven Foundry Coke**

| | |
|---|---|
| Birmingham, ovens | $25.65 |
| Cincinnati, deld. | 30.58 |
| Buffalo, ovens | 27.50 |
| Buffalo, deld. | 28.75 |
| Camden, N. J., ovens | 26.50 |
| Chicago, ovens | 27.00 |
| Detroit, ovens | 27.50 |
| Detroit, deld. | 28.75 |
| Pontiac, deld. | 29.15 |
| Saginaw, deld. | 30.73 |
| Erie, Pa., ovens | 27.50 |
| Everett, Mass., ovens | |
| New England, deld. | *28.55 |
| Indianapolis, ovens | 26.75 |
| Ironton, O., ovens | 26.00 |
| Cincinnati, deld. | 28.59 |
| Kearny, N. J., ovens | 26.75 |
| Lone Star, Tex., ovens | 19.50 |
| Milwaukee, ovens | 27.50 |
| Neville Island, (Pittsburgh) Pa., ovens | 26.25 |
| Painesville, O., ovens | 27.50 |
| Cleveland, deld. | 29.43 |
| Philadelphia, ovens | 26.50 |
| St. Louis, ovens | 28.50 |
| St. Paul, ovens | 26.50 |
| Swedeland, Pa., ovens | 26.50 |
| Terre Haute, Ind., ovens | 26.75 |

*Or within $4.55 freight zone from works.

# Coal Chemicals

**Spot, cents per gallon, ovens**

| | |
|---|---|
| Pure benzene | 36.00 |
| Toluene, one deg. | 32.00-34.00 |
| Industrial xylene | 32.00-35.00 |

Per ton, bulk, ovens

| | |
|---|---|
| Ammonium sulfate | $32.00 |
| Birmingham area | 36.00 |

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

# Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective $CaF_2$ content 72.5%, $38-$39; 70%, $35-$36; 60%, $31-$32. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $34; Mexican, $26.50.

# Electrodes

Threaded with nipple, unboxed, f.o.b. plant

**GRAPHITE**

| Inches Diam | Inches Length | Per 100 lb |
|---|---|---|
| 2 | 24 | $52.50 |
| 2½ | 30 | 33.75 |
| 3 | 40 | 32.00 |
| 4 | 40 | 30.25 |
| 5½ | 40 | 30.00 |
| 6 | 60 | 27.25 |
| 7 | 60 | 26.75 |
| 8, 9, 10 | 60 | 24.25 |
| 12 | 72 | 27.25 |
| 14 | 60 | 23.50 |
| 16 | 72 | 22.50 |
| 17 | 60 | 23.00 |
| 18 | 72 | 22.50 |
| 20 | 72 | 22.25 |

**CARBON**

| | | |
|---|---|---|
| 8 | 60 | 12.10 |
| 10 | 60 | 11.80 |
| 12 | 60 | 11.75 |
| 14 | 60 | 11.70 |
| 14 | 72 | 10.85 |
| 17 | 60 | 10.75 |
| 17 | 72 | 10.35 |
| 20 | 84 | 10.30 |
| 20 | 90 | 10.10 |
| 24 | 72, 84 | 10.30 |
| 24 | 96 | 10.05 |
| 30 | 84 | 10.20 |
| 40, 35 | 110 | 9.90 |
| 40 | 100 | 9.90 |


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MACHINING SPEED...+100%
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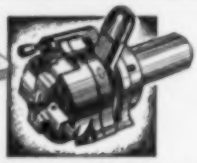

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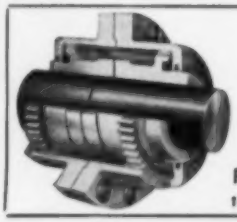

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## Scrap . . .

Scrap Prices, Page 240

**Philadelphia**—Scrap consumers are moving cautiously, pending the outcome of steel wage negotiations. Orders are light. No. 1 heavy melting, No. 1 bundles and No. 1 busheling are easier at $47-$48, delivered; No. 2 heavy melting at $39-$40; and No. 2 bundles at $37-$38. Electric furnace bundles are off $2 a ton to $50, delivered. Mixed borings and turnings are lower at $34; heavy turnings at $43-$44; structurals and plate at $51-$53; and rail crops, 2 ft and under, $64.

**Pittsburgh**—Prices on most industrial scrap have stabilized.

Quotations on railroad scrap have dropped sharply, as have prices on cut structurals, electric furnace bundles and punchings and plate scrap.

**New York**—Trading in steel scrap is light, reflecting uncertainty as to the outcome of steel wage negotiations. Scrap brokers have reduced their buying prices on No. 2 heavy melting to $31-$32; on mixed borings and turnings to $26-$27; on short shoveling turnings to $27-$28; and on low phos structural and plate to $44-$45. Unstripped motor blocks are off to $32-$34.

**Buffalo**—Although the scrap market has been temporarily stabilized by new mill orders, it is still under pressure, and dealers expect lower prices before new purchases are made.

**Cleveland**—Until steel wage negotiations are finished, not much activity is likely in the scrap market. Currently, mills are marking time, riding along on their inventories, which are described as fair.

One representative mill purchase of electric furnace scrap was reported at $50 in the Valley last week, off about $1 from the previously ruling quotation.

**Detroit** — Scrap prices are unchanged and appear to be leveling off. The market tone, however, continues soft. Steel ingot operations in the area are estimated at 95.7 per cent of capacity. This compares with 95.2 a week ago and 93 a year ago.

**Chicago**—The only grades of scrap to slip from the prices established a week ago are blast furnace items. Machine shop turnings are down $2 to $24 a ton, and other grades of turnings and borings are off a like amount to $26 in a consumer purchase.

The feeling prevails that a certain degree of stability may hold the remainder of this month while the steel industry awaits the outcome of new contract negotiations. Mills are buying sparingly and have good inventories. Cast iron grades are likely to remain weak while the foundries shut down for vacations in July.

**Washington**—Consumption of scrap and pig iron during April totaled 6,477,000 gross tons and 6,074,000 tons, respectively, reports the U. S. Bureau of Mines. Both were off 4 per cent from the preceding month. The total melt (12,551,000 gross tons) consisted of 51.6 per cent scrap and 48.4 per cent pig iron, the same as in March.

Stocks of ferrous scrap held by consumers at the end of April totaled 6,014,000 gross tons, a slight decrease from the previous month when 6,127,707 tons were reported. Stocks of pig iron amounted to 1,946,000 tons at the end of April, up slightly from the 1,934,936 tons reported at the end of March.

**Birmingham** — Brokers' prices reflect continued weakness in open-hearth scrap. Consumers are well supplied and have held up shipments, which is causing concern among dealers because of the nearly 50 per cent increase in freight rates on scrap scheduled to go into effect in Alabama on June 15. Steel scrap prices

(*Please turn to page* 242)


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# Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

## STEELMAKING SCRAP COMPOSITE

| | |
|---|---|
| June 13 | $46.00 |
| June 6 | 46.17 |
| Apr. Avg. | 54.90 |
| May 1955 | 34.87 |
| May 1951 | 44.00 |

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania

### PITTSBURGH

| | |
|---|---|
| No. 1 heavy melting | 44.00-45.00 |
| No. 2 heavy melting | 39.00-40.00 |
| No. 1 bundles | 44.00-45.00 |
| No. 2 bundles | 36.00-37.00 |
| No. 1 busheling | 44.00-45.00 |
| Machine shop turnings | 32.00-33.00 |
| Mixed borings, turnings | 32.00-33.00 |
| Short shovel turnings | 36.00-37.00 |
| Cast iron borings | 36.00-37.00 |
| *Cut structurals, 3 ft lengths* | *53.00-54.00* |
| *Heavy turnings* | *42.00-43.00* |
| *Punchings & plate scrap* | *53.00-54.00* |
| *Electric furnace bundles* | *53.00-54.00* |

**Cast Iron Grades**

| | |
|---|---|
| No. 1 cupola | 50.00-51.00 |
| Charging box cast | 46.00-47.00 |
| Heavy breakable cast | 46.00-47.00 |
| Unstripped motor blocks | 34.00-35.00 |
| No. 1 machinery cast | 56.00-57.00 |

**Railroad Scrap**

| | |
|---|---|
| *No. 1 R.R. heavy melt.* | *51.50-52.50* |
| *Rails, 2 ft and under* | *65.00-66.00* |
| *Rails, 18 in. and under* | *66.00-67.00* |
| *Rails, random lengths* | *61.00-62.00* |
| *Railroad specialties* | *59.00-60.00* |

**Stainless Steel Scrap**

| | |
|---|---|
| 18-8 bundles & solids | 360.00-375.00 |
| 18-8 turnings | 255.00-270.00 |
| 430 bundles & solids | 110.00-120.00 |
| 430 turnings | 60.00-65.00 |

### CLEVELAND

| | |
|---|---|
| No. 1 heavy melting | 47.00-48.00 |
| No. 2 heavy melting | 36.00-37.00 |
| No. 1 bundles | 47.00-48.00 |
| No. 2 bundles | 33.00-34.00 |
| No. 1 busheling | 47.00-48.00 |
| Machine shop turnings | 30.00-31.00 |
| Mixed borings, turnings | 34.00-35.00 |
| Short shovel turnings | 34.00-35.00 |
| Cast iron borings | 34.00-35.00 |
| Low phos. | 48.00-49.00 |
| Cut structural plates 2 ft and under | 51.00-52.00 |
| Alloy free, short shovel turnings | 37.00-38.00 |
| Electric furnace bundles | 48.00-49.00 |

**Cast Iron Grades**

| | |
|---|---|
| No. 1 cupola | 53.00-54.00 |
| Charging box cast | 39.00-40.00 |
| Stove plate | 50.00-51.00 |
| Heavy breakable cast | 43.00-44.00 |
| Unstripped motor blocks | 28.00-29.00 |
| Brake shoes | 38.00-39.00 |
| Clean auto cast | 51.00-52.00 |
| Burnt cast | 38.00-39.00 |
| Drop broken machinery | 54.00-55.00 |

**Railroad Scrap**

| | |
|---|---|
| No. 1 R.R. heavy melt. | 51.00-52.00 |
| R.R. malleable | 56.00-57.00 |
| Rails, 2 ft and under | 64.50-65.50 |
| Rails, 18 in. and under | 63.00-64.00 |
| Rails, random lengths | 59.00-60.00 |
| Cast steel | 53.00-54.00 |
| Railroad specialties | 53.00-54.00 |
| Uncut tires | 54.00-55.00 |
| Angles, splice bars | 59.00-60.00 |
| Rails, rerolling | 62.00-63.00 |

**Stainless Steel**

(Brokers' buying prices; f.o.b. shipping point)

| | |
|---|---|
| 18-8 bundles, solids | 345.00-355.00 |
| 18-8 turnings | 205.00-215.00 |
| 430 clips, bundles, solids | 106.00-110.00 |
| 430 turnings | 58.00-60.00 |

### YOUNGSTOWN

| | |
|---|---|
| No. 1 heavy melting | 49.00-50.00 |
| No. 2 heavy melting | 38.00-39.00 |
| No. 1 bundles | 49.00-50.00 |
| No. 2 bundles | 36.00-37.00 |
| No. 1 busheling | 49.00-50.00 |
| Machine shop turnings | 30.00-31.00 |
| Short shovel turnings | 36.00-37.00 |
| Cast iron borings | 36.00-37.00 |
| Low phos. | 51.00-52.00 |
| *Electric furnace bundles* | *49.00-50.00* |

**Railroad Scrap**

| | |
|---|---|
| No. 1 R.R. heavy melt. | 53.00-54.00 |

### CHICAGO

| | |
|---|---|
| No. 1 heavy melting | 44.00-48.00 |
| No. 2 heavy melting | 36.00-37.00 |
| No. 1 factory bundles | 48.00-49.00 |
| No. 1 dealer bundles | 44.00-45.00 |
| No. 2 bundles | 33.00-34.00 |
| No. 1 busheling | 44.00-48.00 |
| *Machine shop turnings* | *23.00-24.00* |
| *Mixed borings, turnings* | *25.00-26.00* |
| *Short shovel turnings* | *25.00-26.00* |
| *Cast iron borings* | *25.00-26.00* |
| Cut structurals, 3 ft.. | 52.00-53.00 |
| Punchings & plate scrap | 53.00-54.00 |

**Cast Iron Grades**

| | |
|---|---|
| No. 1 cupola | 45.00-46.00 |
| Stove plate | 39.00-40.00 |
| Unstripped motor blocks | 32.00-33.00 |
| Clean auto cast | 47.00-48.00 |
| Drop broken machinery | 47.00-48.00 |

**Railroad Scrap**

| | |
|---|---|
| No. 1 R.R. heavy melt | 49.00-50.00 |
| R.R. malleable | 58.00-59.00 |
| Rails, 2 ft and under | 66.00-67.00 |
| Rails, 18 in. and under | 67.00-68.00 |
| Angles, splice bars | 62.00-63.00 |
| Rails, rerolling | 69.00-70.00 |

**Stainless Steel Scrap**

| | |
|---|---|
| 18-8 bundles & solids | 380.00-395.00 |
| 18-8 turnings | 270.00-280.00 |
| 430 bundles & solids | 105.00-110.00 |
| 430 turnings | 55.00-60.00 |

### DETROIT

(Brokers' buying prices; f.o.b. shipping point)

| | |
|---|---|
| No. 1 heavy melting | 38.00 |
| No. 2 heavy melting | 32.00 |
| No. 1 bundles | 39.00 |
| No. 2 bundles | 27.50 |
| No. 1 busheling | 38.00 |
| Machine shop turnings | 23.00 |
| Mixed borings, turnings | 23.00 |
| Short shovel turnings | 27.00 |
| Punchings & plate scrap | 56.00 |

**Cast Iron Grades**

| | |
|---|---|
| No. 1 cupola | 46.00 |
| Charging box cast | 38.00 |
| Stove plate | 38.00 |
| Heavy breakable | 38.00 |
| Unstripped motor blocks | 25.00 |
| Clean auto cast | 51.00 |
| Malleable | 51.00 |

### BIRMINGHAM

| | |
|---|---|
| *No. 1 heavy melting* | *34.00-35.00* |
| *No. 2 heavy melting* | *32.00-33.00* |
| *No. 1 bundles* | *34.00-35.00* |
| *No. 2 bundles* | *24.00-25.00* |
| *No. 1 busheling* | *34.00-35.00* |
| *Cast iron borings* | *20.00-21.00* |
| *Short shovel turnings* | *27.00-28.00* |
| *Machine shop turnings* | *25.00-26.00* |
| *Electric furnace bundles* | *40.00-41.00* |

**Cast Iron Grades (F.o.b. shipping point)**

| | |
|---|---|
| No. 1 cupola | 48.50-49.50 |
| Stove plate | 47.00-48.00 |
| *Bar crops and plate* | *51.00-52.00* |
| *Structural & plate, 2 ft* | *50.00-51.00* |
| Unstripped motor blocks | 37.50-38.50 |
| Charging box cast | 32.00-33.00 |
| No. 1 wheels | 39.00-40.00 |

**Railroad Scrap**

| | |
|---|---|
| *No. 1 R.R. heavy melt.* | *45.00-46.00* |
| *Rails, 18-in. and under* | *60.00-61.00* |
| Rails, rerolling | 65.00-66.00 |
| *Rails, random lengths* | *56.00-57.00* |
| *Angles, splice bars* | *55.00-56.00* |

### PHILADELPHIA

| | |
|---|---|
| *No. 1 heavy melting* | *47.00-48.00* |
| *No. 2 heavy melting* | *39.00-40.00* |
| *No. 1 bundles* | *47.00-48.00* |
| *No. 2 bundles* | *37.00-38.00* |
| *No. 1 busheling* | *47.00-48.00* |
| *Electric furnace bundles* | *50.00* |
| *Mixed borings, turnings* | *34.00* |
| Machine shop turnings | 32.00 |
| Short shovel turnings | 37.00 |
| *Heavy turnings* | *43.00-44.00* |
| *Structurals & plates* | *51.00-53.00* |
| Couplers, springs, wheels | 60.00 |
| *Rail crops, 2 ft & under* | *64.00* |

**Cast Iron Grades**

| | |
|---|---|
| *No. 1 cupola* | *48.00* |
| Malleable | 67.00 |
| *Heavy breakable cast* | *52.00* |
| *Drop broken machinery* | *55.00-56.00* |

### NEW YORK

(Brokers' buying prices)

| | |
|---|---|
| No. 1 heavy melting | 40.00-41.00 |
| *No. 2 heavy melting* | *31.00-32.00* |
| No. 1 bundles | 40.00-41.00 |
| No. 2 bundles | 30.00-31.00 |
| Machine shop turnings | 20.00-21.00 |
| *Mixed borings, turnings* | *26.00-27.00* |
| *Short shovel turnings* | *27.00-28.00* |
| *Low phos. (structural & plate)* | *44.00-45.00* |

**Cast Iron Grades**

| | |
|---|---|
| No. 1 cupola | 44.00-45.00 |
| *Unstripped motor blocks* | *32.00-34.00* |
| Heavy breakable | 44.00-45.00 |

**Stainless Steel**

| | |
|---|---|
| 18-8 sheets, clips solids | 340.00-350.00 |
| 18-8 borings, turnings | 170.00-180.00 |
| 430 sheets, clips, solids | 120.00-125.00 |
| 410 sheets, clips, solids | 100.00-105.00 |

### BOSTON

(Brokers' buying prices; f.o.b. shipping point)

| | |
|---|---|
| *No. 1 heavy melting* | *36.50-37.00* |
| *No. 2 heavy melting* | *28.50-29.50* |
| *No. 1 bundles* | *36.50-37.00* |
| No. 2 bundles | 27.50-28.00 |
| *No. 1 busheling* | *36.50-37.00* |
| *Machine shop turnings* | *20.50-21.50* |
| *Mixed borings, turnings* | *24.50-25.00* |
| *Short shovel turnings* | *25.50-26.50* |
| No. 1 cast | 42.00-42.50 |
| Mixed cupola cast | 40.50-41.00 |
| No. 1 machinery cast | 43.50-44.00 |

### BUFFALO

| | |
|---|---|
| No. 1 heavy melting | 45.00-46.00 |
| No. 2 heavy melting | 36.00-37.00 |
| No. 1 bundles | 45.00-46.00 |
| No. 2 bundles | 33.00-34.00 |
| No. 1 busheling | 45.00-46.00 |
| Mixed borings, turnings | 27.00-28.00 |
| Machine shop turnings | 26.00-27.00 |
| Short shovel turnings | 28.00-29.00 |
| Cast iron borings | 27.00-28.00 |
| Low phos. | 50.00-51.00 |

**Cast Iron Grades (F.o.b. shipping point)**

| | |
|---|---|
| No. 1 cupola | 45.00-46.00 |
| No. 1 machinery | 50.00-51.00 |

**Railroad Scrap**

| | |
|---|---|
| Rails, random lengths | 54.00-55.00 |
| Rails, 3 ft and under | 59.00-60.00 |
| Railroad specialties | 50.00-51.00 |

### CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

| | |
|---|---|
| *No. 1 heavy melting* | *42.00-43.00* |
| No. 2 heavy melting | 33.50-34.50 |
| *No. 1 bundles* | *42.00-43.00* |
| *No. 2 bundles* | *30.00-31.00* |
| *No. 1 busheling* | *42.00-43.00* |
| Machine shop turnings | 24.00-25.00 |
| Mixed borings, turnings | 28.00-29.00 |
| Short shovel turnings | 28.00-29.00 |
| *Cast iron borings* | *28.00-29.00* |
| Low phos., 18 in. | 52.00-53.00 |

**Cast Iron Grades**

| | |
|---|---|
| No. 1 cupola | 43.00-44.00 |
| Heavy breakable cast | 43.00-44.00 |
| Craging box cast | 43.00-44.00 |
| Drop broken machinery | 53.00-54.00 |

**Railroad Scrap**

| | |
|---|---|
| *No. 1 R.R. heavy melt.* | *49.00-50.00* |
| Rails, 18 in. and under | 65.00-66.00 |
| Rails, random lengths | 58.00-59.00 |

### ST. LOUIS

(Brokers' buying prices)

| | |
|---|---|
| *No. 1 heavy melting* | *36.00* |
| *No. 2 heavy melting* | *34.00* |
| *No. 1 bundles* | *36.00* |
| *No. 2 bundles* | *30.00* |
| *No. 1 busheling* | *36.00* |
| Machine shop turnings | † |
| Short shovel turnings | 28.00 |

**Cast Iron Grades**

| | |
|---|---|
| *No. 1 cupola* | *44.00* |
| *Charging box cast* | *30.00* |
| *Heavy breakable cast* | *30.00* |
| *Unstripped motor blocks* | *30.00* |
| Brake shoes | 42.00 |
| Clean auto cast | 45.00 |
| *Stove plate* | *38.00* |

**Railroad Scrap**

| | |
|---|---|
| *No. 1 R.R. heavy melt.* | *49.50* |
| *Rails, 18 in. and under* | *64.00* |
| *Rails, random lengths* | *60.00* |
| *Rails, rerolling* | *69.00* |
| *Angles, splice bars* | *52.00* |

†Nominal

### SEATTLE

| | |
|---|---|
| *No. 1 heavy melting* | *43.00-44.00* |
| *No. 2 heavy melting* | *39.00-40.00* |
| *No. 1 bundles* | *39.00-40.00* |
| *No. 2 bundles* | *30.00-31.00* |
| No. 3 bundles | 20.00 |
| Machine shop turnings | 23.00-25.00 |
| Mixed borings, turnings | 23.00-25.00 |
| *Electric furnace No. 1* | *52.00-54.00* |

**Cast Iron Grades (F.o.b. shipping point)**

| | |
|---|---|
| No. 1 cupola | 40.00-43.00 |
| *Heavy breakable cast* | *36.00-38.00* |
| No. 1 wheels | 37.00 |
| *Unstripped motor blocks* | *40.00* |
| *Stove plate (f.o.b. plant)* | *30.00-31.00* |
| Brake shoes | 38.00 |

**Railroad Scrap**

| | |
|---|---|
| *Rails, random lengths* | *43.00-44.00* |

### LOS ANGELES

| | |
|---|---|
| No. 1 heavy melting | 38.00 |
| No. 2 heavy melting | 32.00 |
| No. 1 bundles | 37.00 |
| No. 2 bundles | 28.00 |
| Machine shop turnings | 17.00 |

**Cast Iron Grades (F.o.b. shipping point)**

| | |
|---|---|
| No. 1 cupola | 42.00 |

### SAN FRANCISCO

| | |
|---|---|
| No. 1 heavy melting | 43.00 |
| No. 2 heavy melting | 40.00 |
| No. 1 bundles | 42.00 |
| No. 2 bundles | 35.00 |
| Machine shop turnings | 20.00-23.00 |
| Mixed borings, turnings | 20.00-23.00 |
| Cast iron borings | 20.00-23.00 |
| Short shovel turnings | 25.00 |
| Cut structurals | 45.00 |
| Heavy turnings | 20.00-23.00 |
| Punchings & plate scrap | 44.00 |

**Cast Iron Grades**

| | |
|---|---|
| No. 1 cupola | 48.00 |
| Charging box cast | 42.00 |
| Stove plate | 39.00 |
| Heavy breakable cast | 39.00 |
| Unstripped motor blocks | 38.00 |
| Brake shoes | 35.00 |
| Clean auto cast | 48.00 |
| No. 1 wheels | 39.00 |
| Burnt cast | 23.00 |
| Drop broken machinery | 50.00 |

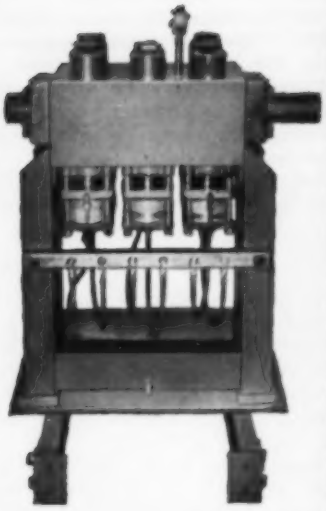
### HAMILTON, ONT.

| | |
|---|---|
| No. 1 heavy melting | 45.00 |
| No. 2 heavy melting | 40.00 |
| No. 1 bundles | 45.00 |
| No. 2 bundles | 37.50 |
| Mixed steel scrap | 39.00 |
| Busheling, new factory: Prepared | 43.00 |
| Unprepared | 39.00 |
| Short steel turnings | 28.00 |

**Cast Iron Grades†**

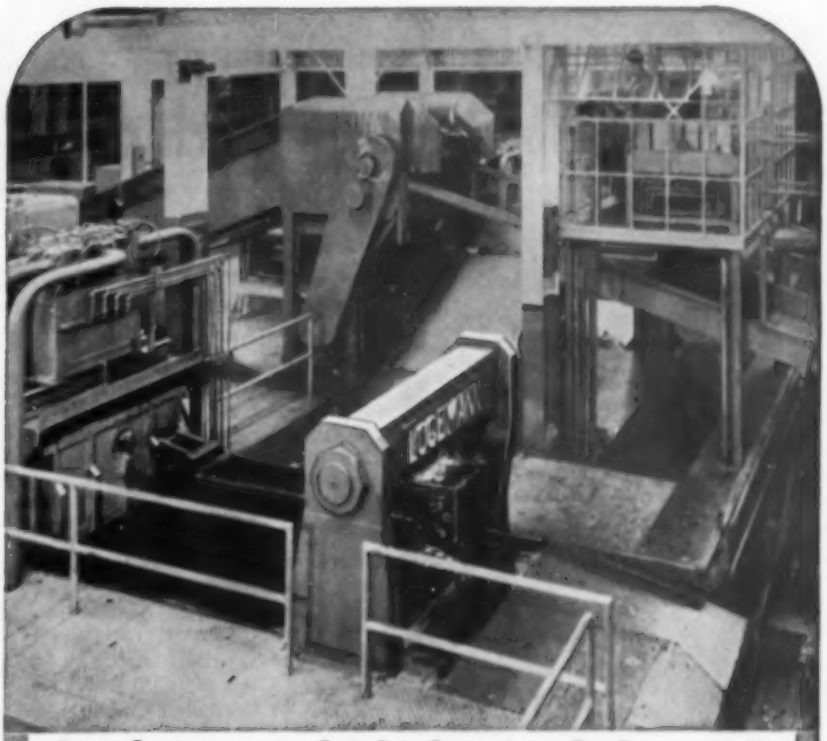
| | |
|---|---|
| No. 1 machinery cast | 50.00 |

†F.o.b., shipping point.



## LOGEMANN HYDRAULIC OPERATING VALVE

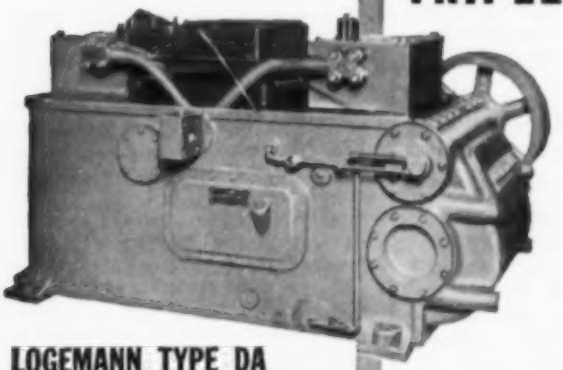
This compact valve was designed to control the movements of the hydraulic rams in large scrap presses but can be modified to suit similar operations on other hydraulic equipment. Interested parties will please outline the nature of the service, operating sequence, gallonage and pressure requirements.




# Get low cost, high density bales with LOGEMANN SELF-CONTAINED TRIPLE-COMPRESSION PRESSES

The illustration shows one of two large scrap-press units in a modern automotive plant. Over a period of many years, such units have baled sheet scrap skeletons and trim from metal operations in large industrial plants throughout the country, forming the scrap into high-density bales for re-melting in steel mills. Low baling costs are the result of correct design for heavy duty service, minimum maintenance and operating interruptions, as well as simplicity, accessibility and safety features.

Pioneers in the metal baling field, LOGEMANN engineers embodied in the design those features that have proven dependable over an extended period of years. Some installations in service over 35 years are still operating economically.



## LOGEMANN TYPE DA DOUBLE PRESSURE PUMPS

These compact and efficient opposed-cylinder reciprocating-plunger pumps for low and high pressure service lend themselves to a wide range of double pressure applications. They are close-coupled, reliable, and capable of delivering high gallonage, at low and high pressures, at low power costs.

## Tell Us the nature of your scrap!

LOGEMANN press sizes are not confined to the large models. Producers of sheet scrap—steel, copper, brass, or aluminum—are invited to submit their scrap baling problems regardless of tonnage. Please state the character of the metal, minimum tonnage to be handled in a given period of hours, range of gauges and, where possible, indicate maximum and minimum lengths and widths of pieces. Experienced sales engineers are available for discussion of your conditions and requirements.

# LOGEMANN BROTHERS CO.

**3126 W. BURLEIGH STREET • MILWAUKEE 10, WISCONSIN**

# Abrasive Cutting | *the best way to cut many materials the only way to cut some*

# Campbell Cut-Off Machines

Rough, serrated cut of metal saw

Smooth-finished cut of CAMPBELL Abrasive Cut-Off Machine with ALLISON Wheel

### Smooth cutting saves grinding operation for American Gear & Mfg Co.

Cross sections of gear teeth—smooth, fine-finished and ready for metallurgical study—save an entire extra grinding operation at the Lemont, Illinois plant of American Gear & Mfg. Co., a division of Brad Foote Gear Company.

These test samples are neatly "sliced" down to a single gear tooth in thickness on a CAMPBELL 406 Oscillating Wet Abrasive Cut-Off Machine, equipped with just the right ALLISON Abrasive Wheel for the job. These sections with fine finish, no hard spots, no change in metallurgical characteristics, come from the WET cut with abundant coolant applied just where it does the most good. It's the OSCILLATION of the abrasive wheel... the right one for the job... that handles big cuts like this with speed and economy.

### Campbell Engineering Service costs you nothing —can save you much

What is your metal cutting problem? Does it involve cutting of alloy or high carbon steel? Our Field Engineers, abrasive cutting specialists, can help you arrive at that particular combination of CAMPBELL Cut-Off Machine and ALLISON Cutting Wheel that will improve your operation and save you money.

### Examples of Economy Abrasive Cutting gives

• A large aircraft manufacturer reports CAMPBELL Abrasive Cut-Off Machines cut stainless steel tube twice as fast as other methods—saving $32,000 in the first year of operation.

•

International Nickel's tough K Monel, 4¼" dia., is cut in 2 minutes per cut on a CAMPBELL Oscillating Wet Abrasive Cut-Off Machine.

*Let us send you this book*

ACCO

Campbell Machine Division
AMERICAN CHAIN & CABLE

925 Connecticut Avenue, Bridgeport 2, Connecticut


(*Concluded from page* 239)

dropped $1 to $4 a ton on nearly all items, with electric furnace bundles taking the biggest dip on limited purchases. The cast market continues firm. The export market is quiet.

**Cincinnati**—The scrap market has turned unusually quiet, with the trade awaiting the outcome of steel wage negotiations.

**Los Angeles**—Cast scrap is moving actively despite complaints of melters that the posted price on No. 1 cupola is out of line.

**San Francisco**—Foreign buying of steel scrap continues heavy. A source of local strength is the announcement in Los Angeles that preparations are being made to ship 400,000 tons of scrap to Japan through the Los Angeles harbor during the next 12 months.

**Seattle**—The scrap market is active. Domestic and export sales are in heavy volume. Buyers are watching developments on the labor front closely.

**St. Louis**—Most grades of scrap show further price declines, ranging from $1 to $3. The majority of the grades sagged $2 and $3. No. 1 heavy melting, No. 1 bundles, No. 1 busheling, rerolling rails and angles and splice bars each dropped $3.

## Pig Iron . . . .

Pig Iron Prices, Page 227

Pig iron sellers are under great pressure from foundries to increase and expedite shipments this month. Some of this push comes from the fact that many shops will be closed for vacations in July, but most of it from the desire to hedge against a price advance after midyear and to protect their stock position in event of a steel strike. Growing iron inventories could considerably reduce purchases in the third quarter.

In low phos, at least, one eastern seller reports a shortage in supply.

The foundry industry anticipates a high level of operations in the fall. Output of castings is expected to be at least as good as a year ago.

## Structural Shapes . . .

Structural Shape Prices, Page 223

Structural market activity has slowed down a bit, probably because of the scarcity of steel, extended deliveries by the fabricating shops and uncertainty of the labor and price picture.

Although structural contracts are somewhat less numerous at the moment, a lot of work is being figured, and fabricating shops hold heavy backlogs.

Considerable bridge work awaits

affirmative action. Bids were closed recently on 6000 tons of New York state bridge work, involving eight fabricated projects, and substantial tonnage (8500 tons) is up for turnpike jobs in Connecticut.

Indicative of continued strong industrial demand are several sizable projects throughout the country for the General Electric Co.

Structural awards so far this year are still running ahead of last. This is indicated by the latest report of the American Institute of Steel Construction, which shows the placing of 1,481,347 tons for the first four months of this year, compared with 1,030,918 tons in the corresponding period last year, an increase of 43 per cent. April awards were the second highest reported so far this year, amounting to 378,937 tons, against the January high of 405,396 tons and 270,226 tons in April, 1955.

Shipments for the first four months amounted to 1,133,254 tons, up 25 per cent from last year's total for that period. April shipments of 289,616 tons were off slightly from the record high of 306,760 tons in March. Backlogs as of Apr. 30 totaled 2,687,256 tons—1,106,865 tons were reported scheduled for fabrication during the following four months.

## STRUCTURAL SHAPES . . .

### STRUCTURAL STEEL PLACED

2000 tons, superstructure, Morrison street bridge, Portland, Oreg., to American Bridge Division, U. S. Steel Corp., Portland, low at $2,270,443 to Multnomah county commissioners.

1800 tons, bridge, over Elizabeth river, for the Norfolk-Portsmouth Belt Line, Norfolk, Va., to American Bridge Division, U. S. Steel Corp., Pittsburgh.

715 tons, ramp, Philadelphia approach, Philadelphia-Gloucester bridge, Delaware River Port Authority, through Kaufman Construction Co., general contractor, to Mt. Vernon Bridge Co., Mt. Vernon, O.

630 tons, transmission towers, Philadelphia Electric Co., Philadelphia, to Blaw-Knox Co., Pittsburgh.

250 tons, plant building, Rohr Aircraft Co., Auburn, Wash., to Leckenby Structural Steel Co., Seattle.

### STRUCTURAL STEEL PENDING

6000 tons, eight state bridge projects, New York; bids closed June 7.

2080 tons, ten grade separations, railroad and stream crossing, and one stream crossing structure, Connecticut turnpike project 328-01, Ledyard - Griswold-Plainfield; bids June 25, Hartford, Conn.

1200 tons, power plant, Delaware Power & Light Co., Indian River, Del.; United Engineers & Constructors, Philadelphia, engineer.

970 tons, seven grade separations, Connecticut turnpike project 330-01 Plainfield-Killingly; bids June 25, Hartford, Conn.

400 tons, state bridge, Lehigh county, Pa. A. C. Hack & Sons Inc., Bloomsburg, Pa., low on general contract.

245 tons, channels, east and west coasts; bids to General Stores Supply Office, Navy, Philadelphia.

235 tons, state highway bridge, Quinegaug river, Putnam, Conn.; Brunalli Construction Co. Inc., Southington, Conn., low, general contract.

200 tons, law school dormitory, University of Pennsylvania, Philadelphia, John McShain, that city, awarded general contract.

115 tons, highway bridge near Glendo, Wyo.; bids June 28, Bureau of Reclamation, Denver.

## REINFORCING BARS . . .

### REINFORCING BARS PLACED

350 tons, high school, Wapato, Wash., to Soule Steel Co., Seattle.

### REINFORCING BARS PENDING

1150 tons, 13 grade separations, two stream and railroad crossings, Connecticut turnpike project 326-01, Montville-Norwich; bids June 18, Hartford, Conn.; also 705 tons, steel piling.

1085 tons, ten grade separations, railroad and stream crossing and one stream crossing, Connecticut turnpike project 328-01, Ledyard-Griswold-Plainfield; bids June 25, Hartford, Conn.

795 tons, seven grade separations and one reinforced concrete box culvert, Connecticut turnpike project 330-01, Plainfield-Killingly; bids June 25, Hartford, Conn.

600 tons, Jefferson Park junior high school, Seattle; Henrik Valle Co., Seattle, low at $1,698,950.

500 tons, west approaches, Morrison street bridge, Portland, Oreg.; bids to Multnomah county commissioners July 3.

475 tons, five grade separations and five reinforced concrete box culverts, Connecticut turnpike project 325-01, Waterford-Montville; bids June 18, Hartford, Conn.

175 tons, two state bridges, Providence, R. I.; bids June 13; also 355 tons, structural steel (beams).

165 tons, bridge, Natchez Trace parkway, Mississippi highway 41; bids to Bureau of Roads, Florence, Ala.

105 tons, bridge reconstruction, Revere Beach parkway, Medford-Everett, Mass.; Berke-Moore Co., Boston, low, general contract; also 415 tons, structural steel.

## PLATES . . .

### PLATES PLACED

115 tons, storage tank, Spokane, Wash., to unstated local fabricator.

### PLATES PENDING

1200 tons, four 50,000-bbl fuel storage tanks, facilities and equipment, Ft. Richardson, Alaska; bids to U. S. Engineer, June 27; this project was bid and tenders rejected several months ago.

375 tons, two floating roof tanks, Walker Air Force Base, Roswell, N. Mex.; bids about June 28, Corps of Engineers, Albuquerque, N. Mex.

100 tons, water tank; bids to Coquille, Oreg., June 18.

100 tons, marine boiler plate, east and west coasts; bids in to General Stores, Supply Office, Navy, Philadelphia; also 120 tons, stainless sheets, and 35 tons, stainless plates.

## PIPE . . .

### CAST IRON PIPE PLACED

180 tons, for Coquille, Oreg., divided 40 tons to U. S. Pipe & Foundry Co., Seattle, and the remainder to an unstated interest.

### CAST IRON PIPE PENDING

877 tons, various sizes; bids to Hillsboro, Oreg., June 19.

185 tons, 6 to 12 in.; bids to Shelton, Wash., June 19.

143 tons, 4 to 12 in.; bids to Portland, Oreg., June 12.

40 tons, 6 in.; bids to Astoria, June 15.

## RAILS, CARS . . .

### RAILROAD CARS PLACED

Jersey Central, three rail diesel cars, to the Budd Co., Philadelphia.

Virginian, 500 seventy-ton steel hopper cars, 35 fifty-five-ton pulp wood cars, and 25 steel caboose cars, to own shops at Princeton, W. Va.

### RAILROAD CARS PENDING

Minneapolis & St. Louis, 250 hopper cars, 100 covered hopper cars and 30 special type boxcars.


**FOR SALE**

**DRAW BENCH**

About 30,000-pound pull single chain 18¾" diameter of chain pin—has simple push in attachment and many dies for hex, round, etc., to 2". 40 h.p. 220/440 volt A.C. 3 phase motor. Capacity: 24' long, 20' per minute.

**4" SHUSTER TWO PLANE ROLL TYPE SHAPE STRAIGHTENER AND CUT-OFF MACHINE**

Model A-1, 20 h.p. 440 volt A.C. 3 phase motor. Capacity: 1" hex, square and round x 12", includes numerous rolls and shear tools.

**R-14 AUTOMATIC LATHE SENECA FALLS LO-SWING**

30 h.p. 220/440 volt A.C. 3 phase motor. For sale by owner.

**V. A. SPOEHR**
**THE H. M. HARPER COMPANY**
**MORTON GROVE, ILL.**
PHONE: OGehard 3-1321

**FOR SALE**

1 BLAKESLEE MODEL DP DEGREASER USED TWO WEEKS.
1 CUSTOM BLAKESLEE—MODEL TE-YP VAPOR - SPRAY TYPE — BOILER & STILL, PUMPS & TANKS INCLUDED. SUITABLE FOR HIGH PRODUCTION.
1 VICTOR-PENINSULAR GAS FIRED CONTINUOUS DRAWING FURNACE WITH MOTORS, CONTROLS, CONVEYOR FEED, ETC.

ALL IN EXCELLENT CONDITION
IMMEDIATELY AVAILABLE
INFORMATION ON REQUEST.

**MR. G. FORWARD**
**OTTO BERNZ CO., INC.**
**280 LYELL AVE., ROCHESTER 6, N. Y.**
**PHONE: GLenwood 9063**

**STEEL PLATE WANTED**

**100 Tons—¼" x 72" x 240"**
**100 Tons—⅛" x 72" x 240"**

***PLEASE QUOTE PRICE & DELIVERY***
***WILL ACCEPT PARTIAL SHIPMENTS***

**EASTERN ENTERPRISES**
Box 737, Springfield, Mass.

**ASSISTANT TO VICE PRESIDENT IN CHARGE OF SALES**

**SALES ENGINEER**

Steel plate fabricator in the Pittsburgh district. Has excellent, unlimited opportunity for a man with experience in pressure vessels, welded pipe, and other fabricated products.

Very modern plant employing approximately 125 men and dealing mainly in special alloy products.

Excellent opportunity for rapid advancement and good salary.

All letters will be held in strict confidence. Address Box No. 433, STEEL, Penton Bldg., Cleveland 13, Ohio.

**CLASSIFIED**

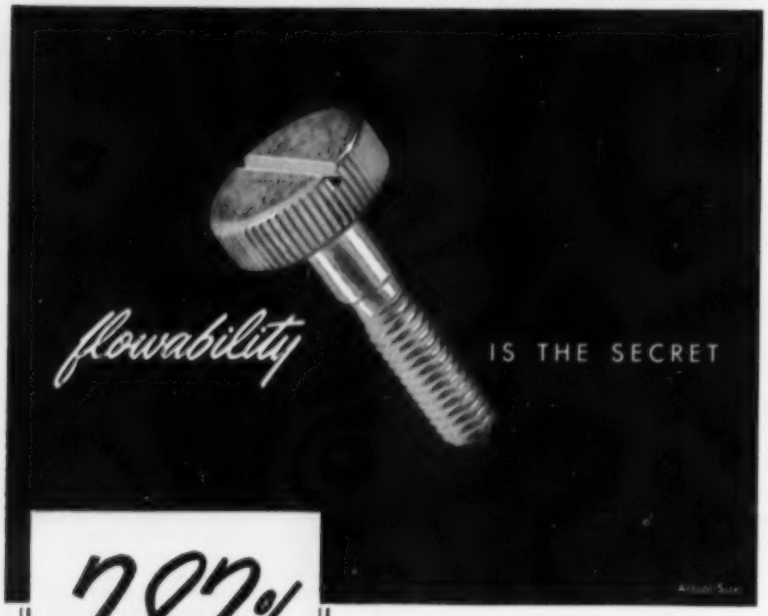
**Help Wanted**

STEEL WAREHOUSE MAN with experience in sheets, bars, structurals, aluminum, etc. required for inside sales and purchasing in order dept. of a large well-rated, long established N.E. Philadelphia warehouse. Must be management material and capable of assuming responsibility. Salary open. Moving expense allowance. Write complete background giving age and experience. Replies kept in strict confidence. Our men know of this advertisement. Reply Box 431, STEEL, Penton Bldg., Cleveland 13, Ohio.

INDUSTRIAL FURNACE DESIGNER
Drever Company requires qualified man in broad field of furnace work. Profit Sharing Plan for all employees. Write Drever Company, Red Lion Rd. & Philmont Ave., Bethayres, Pa., Attn: Engr. Dept. This is suburban Philadelphia.

HELP WANTED
ROLL TURNER—Merchant Bar Mills 18" and 12"—Regular and special bar sections. Furnish resume, age, experience, references and salary expected. Address Box 428, STEEL, Penton Bldg., Cleveland 13, Ohio.

KEYSTONE *XL* COLD HEADING WIRE




# 282% MATERIAL SAVED...

## USING KEYSTONE *XL* COLD HEADING WIRE

This circuit breaker part was machined at one time. But, cold-heading experts analyzed its design and decided that it could be successfully formed from Keystone "XL" Cold Heading Wire. The result—a material waste reduction from 75% to 7%—and a saving of 282% in steel, plus faster, lower cost production and a finished product that is stronger and free from defects.

Keystone "XL" Cold Heading Wire is not just ordinary cold heading wire. It is wire made to your specific order to exactly solve your difficult cold heading problems. Special drawing, annealing and coating "secrets" produce a wire of exceptional *flowability*. Originally developed for recessed head screws, Keystone "XL" Wire is now widely used to solve many of the toughest cold heading problems at great savings in time and money.

**SEND FOR FREE "COLD HEADING" BOOKLET**

Get your copy of a new, valuable reference book containing many technical and informative facts about the modern cold heading process. Remember, too, that Keystone specializes in all types of wire for all types of industrial needs. Write us about your need!

KEYSTONE STEEL & WIRE COMPANY, PEORIA 7, ILLINOIS

**KEYSTONE WIRE *for Industry***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**The Good in our slogan**

F. J. Sorensen

CHAIRMAN, THE CINCINNATI GEAR CO.

Our slogan, "Gears . . . Good Gears Only," seems almost unpretentious by modern standards. In this day of soaring advertising superlatives and grandiose claims of product superiority, we feel it sounds a little old-fashioned—and that's just the way we want it.

There is little about our production today, from a technological stand-point, that resembles our operations of even a few decades ago. New modern machinery in an ultra-modern plant has enabled us to offer a degree of precision and efficiency undreamed-of in our fathers' time. But, while we've striven to be second to none in utilizing the advancements made possible through technological progress, we've also attempted to retain something of the old-fashioned craftsmanship and pride of workmanship that is all too often lost in the modern shuffle of mass production.

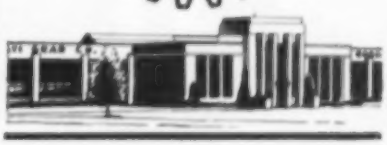
We specialize in just one thing: the manufacture of the best custom gears that can be produced. To our modern production techniques we add this old-fashioned ingredient of craftsmanship; the result is just what is promised in our simple slogan: we produce *good* gears, and good gears *only*. This simple claim is backed by our reputation — we *deliver* good gears only. It's a claim and a reputation we intend to perpetuate for many years to come.

**THE CINCINNATI GEAR CO.**

CINCINNATI 27, OHIO

*"Gears—Good Gears Only"*

CINTI



# Your customers may need this drive...

**TO AUTOMATE YOUR MOTOR DRIVEN PRODUCTS...**
**GIVE THEM PRECISE, VARIABLE SPEED CONTROL...**

Century Performance-Rated©

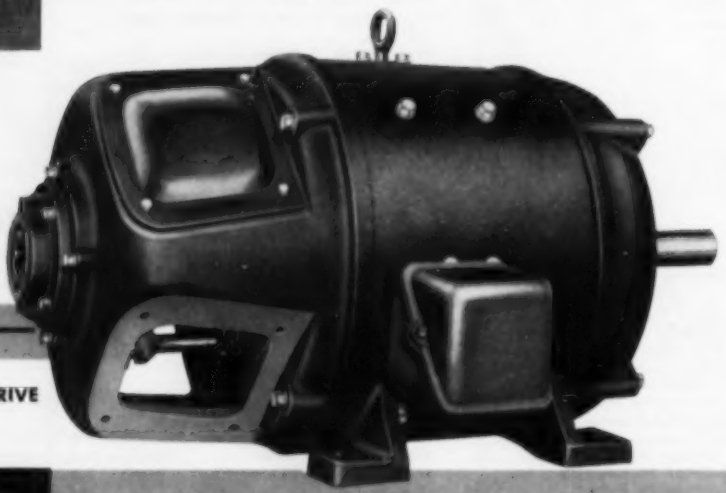
## SELECTIVE SPEED DRIVE

How many of your customers could use the *full* potential of your product when given automatic operation by a Century Selective Speed Drive? Possibly more than you think.

Here's why. Predetermined, *automatic* manufacturing operations are faster, more accurate than manually controlled operations. A Century Selective Speed Drive on your product will respond to changes in operations—such as varying temperature, pressure, size, viscosity—and *automatically* adjust motor speed to fit the job.

Operating from AC, these drives offer a broad range of DC stepless speed control. They can regulate speed for individual drives or for precision interlocked multi-motor drives . . . can be used for jogging, normal or fast starts and stops, forward or reversing . . . and respond to a wide variety of remote control devices.

Century has more than 50 years' experience in engineering DC motors. For information on any motor application, call or write your nearby Century District Sales Office or Authorized Distributor.



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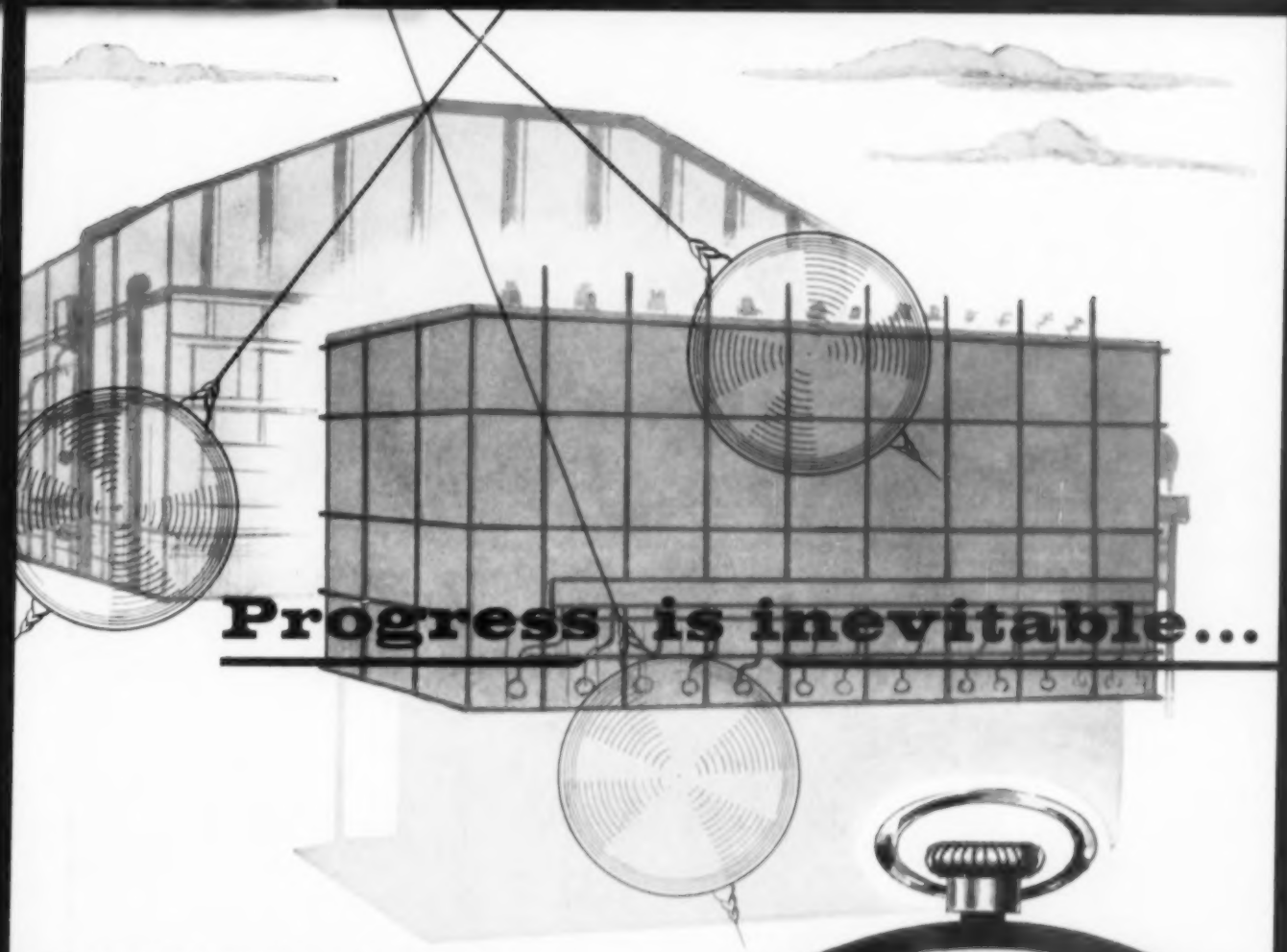
*Performance-Rated* © MOTORS 1/20 to 400 H.P.

**CENTURY ELECTRIC COMPANY**

1806 Pine Street • St. Louis 3, Missouri • *Offices and Stock Points in Principal Cities*



# Progress is inevitable...

***Major steel producers are turning to the production-proved Lee Wilson Single Stack System for flexibility, speed and economy***

● From eight-stack to four-stack — and now single stack — that's the way of progress in steel sheet coil annealing.

Some years ago, larger steel producers were annealing in eight-stack furnaces. Then it was discovered they could actually get more work out at lower costs by reducing the size of the furnace to half. Now, these same devotees of high production are finding they can boost output per pedestal 50 per cent or more by reducing the furnace operation to a single stack of coils, and effect substantial savings in the bargain.

Wilson engineers have made great efforts to gather cost and efficiency data from leading mills for both single and four-stack installations. These reports prove beyond a doubt that a complete single stack installation is the fastest and least expensive to install, maintain and operate, with the quality which must result from truly *automatic* temperature control for every stack of coils.

**Lee Wilson*** **ENGINEERING COMPANY, INC.**

20005 WEST LAKE ROAD • CLEVELAND 16, OHIO

SINGLE-STACK RADIANT TUBE ANNEALING FURNACES

MAKE THE BEST METALS BETTER

* ORIGINATORS AND LEADING PRODUCERS OF SINGLE STACK RADIANT TUBE FURNACES

B 1002B

# Straightens tubes of standard wall thicknesses, in all grades, from 4½" to 16½"

## ...40 TIMKEN® *bearings carry the load!*

WHEN the Sutton Engineering Company built their new No. 5 M KTC tube straightener, they knew it had to give many years of rugged service despite heavy loads and constant use. So they mounted the two driven rolls, five idler rolls, speed reducer and table rolls on Timken® tapered roller bearings.

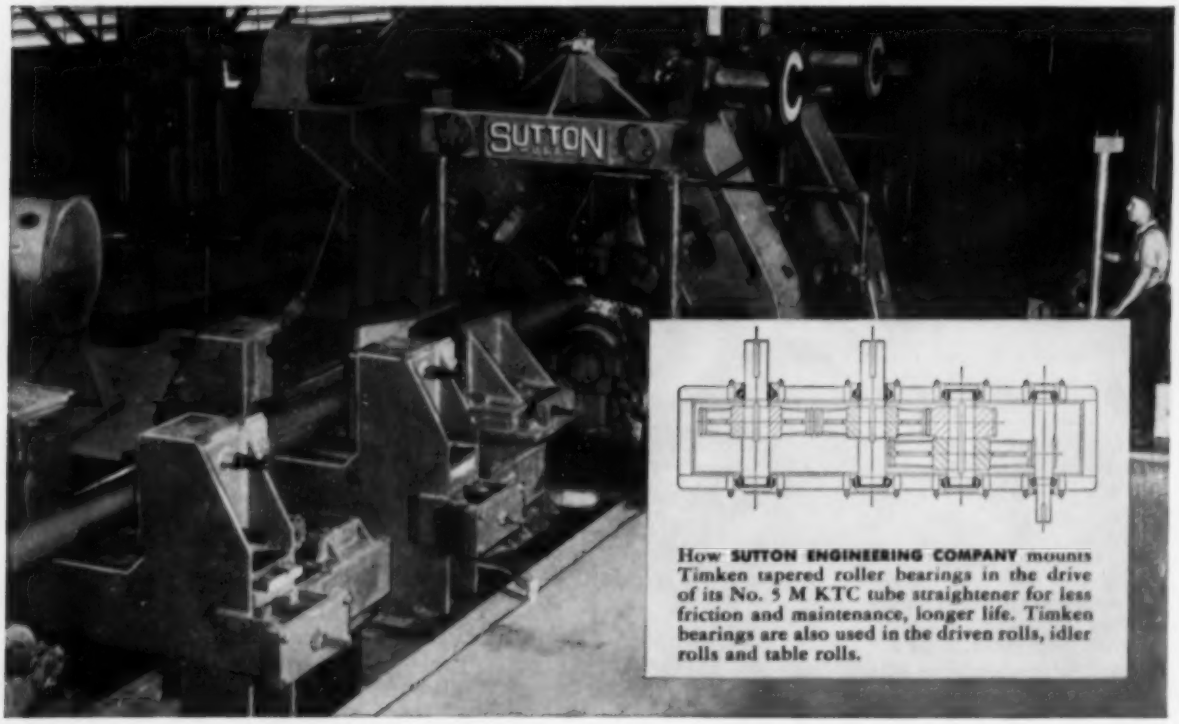
Timken bearings on the rolls easily handle the heavy radial and thrust loads as tubes up to 16½" pass through. That's because Timken bearings are tapered—take radial and thrust loads in any combination. No thrust bearings are required. And full line contact between rollers and races gives them extra load-carrying capacity. Timken bearings keep shafts in accurate alignment, assure smooth operation.

The compactness of Timken bearings permits a high load-carrying capacity in a relatively small-size bearing. Valuable space is saved.

Wear is held to a minimum because Timken bearings practically eliminate friction. They're designed by geometrical law to have true rolling motion. They're made with microscopic accuracy to conform to their design. And they're made of steel we make ourselves. We're the only bearing maker in the country who takes this extra step to insure quality.

To get all these advantages, always specify Timken bearings in the equipment you build or buy. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

*This symbol on a product means its bearings are the best.*






How **SUTTON ENGINEERING COMPANY** mounts Timken tapered roller bearings in the drive of its No. 5 M KTC tube straightener for less friction and maintenance, longer life. Timken bearings are also used in the driven rolls, idler rolls and table rolls.

### IT'S TIMKEN BEARINGS FOR VALUE!

To get the best value in bearings you may find this simple formula helpful:

$$Value = \frac{quality + service + public\ acceptance}{price}$$

Obviously a big advantage *above* the line gives you more value than a small one *below*. No other bearing can match the uniform high quality, engineering and field service and overwhelming public acceptance you get with Timken bearings.

**TIMKEN**

TRADE-MARK REG. U. S. PAT. OFF.

**TAPERED ROLLER BEARINGS**

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◫ AND THRUST ⊣◫⊢ LOADS OR ANY COMBINATION ✳